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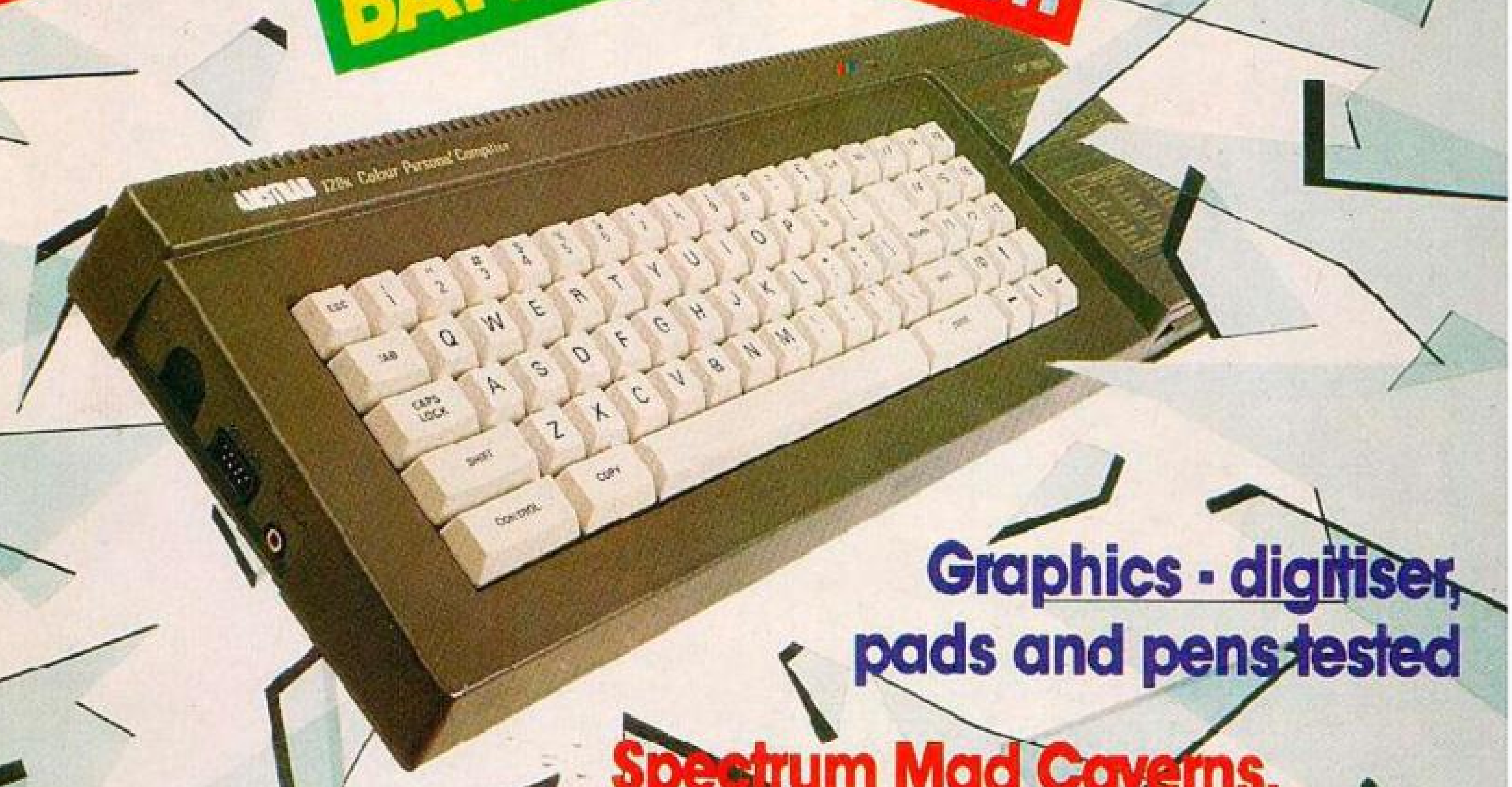
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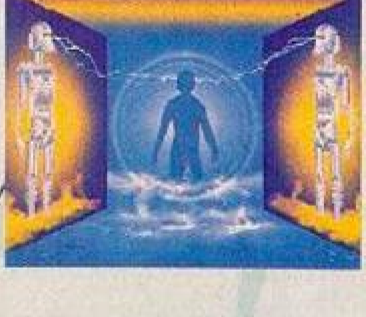
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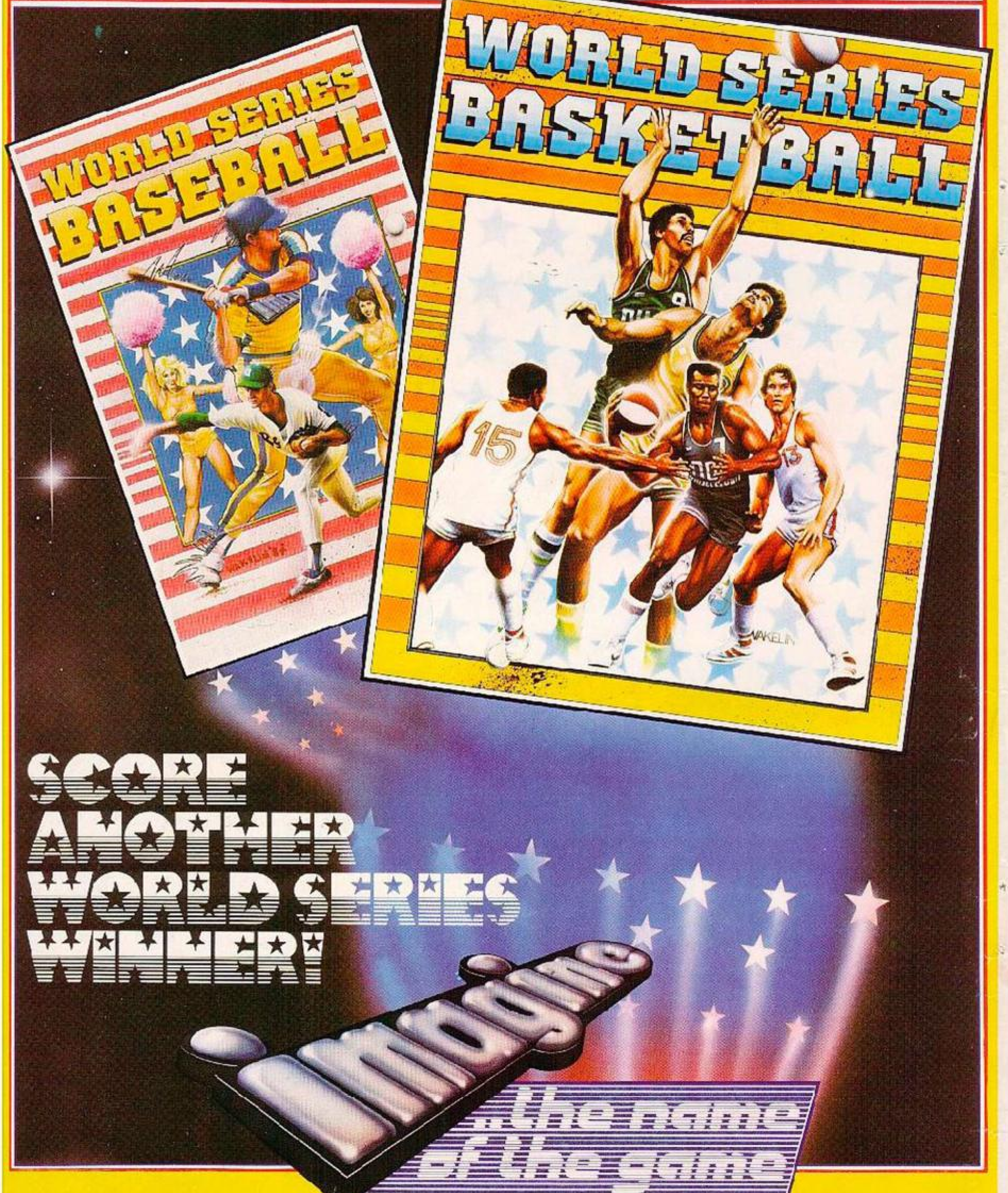
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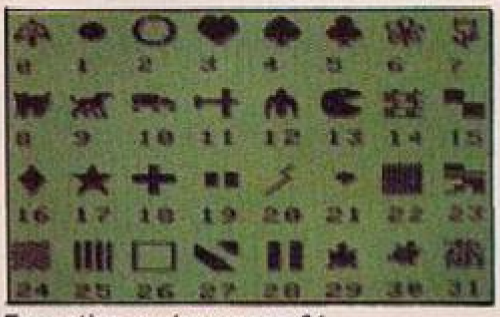
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YOUR COMPUTER Contents

SEPTEMBER 1985



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12 **NEWS:** Eureka — Britain finds a European alternative to MSX; Commodore Amiga launch; Acorn reborn; Sinclair future; CBM-128 price £269; Pi-Man found.

19 **YOUR LETTERS:** Jumping out of For/Next loops — a professor writes; an enraged reader calls our Kath to account; something fishy about Micronet 800?

23 **SOFTWARE SHORTLIST:** Memories of the UN police action in Korea relived in Mig Alley Ace; Frank Bruno and Rocco fight it out; Mattex's stunning Highway Encounter.

37 **HARDWARE HITLIST:** Logotron sprite board for the BBC Micro; and Minor Miracle's modem featuring Databeeb communications package — all the add-ons and more.

39 **QUEST CORNER:** The classic adventure continues — Melbourne House's Mordon's Quest; roll up for the magical mystery tour with the Beatle Quest.

40 **AMSTRAD'S BATTERING RAM:** Yee-hee! 128K micro plus disc plus monitor and CP/M — all this for only £300. Excited? Simon "Scoop" Beesley certainly is.

43 **AMSTRAD 6128 COMPETITION:** Win one of the new Amstrad machines exclusively reviewed in *Your Computer* this month. You saw it here first, remember.

44 **MUD — MULTI-USER DUNGEON:** Lee Paddon plunges into the modem dungeon; your chance to win a MUDpack — map, instructions — all you need to get into MUD.

46 **THE LIGHTPEN FANTASTIC** — graphics, lightpens, plotters. John Dawson scribbles away and introduces you to all the hardware you need for micro-doodling.

51 **EDUCATION — SWOTWARE AND THE PUPIL:** Smartest girl in school Josephine Adams delivers an end of term report on so-called educational software.

56 **INSIDE US GOLD:** Meirion Jones sneaks out with candid shots of Desert Fox, Winter Games, Goonies, Zorro and glimpses an Alternative Reality.

60 **SPECTRUM MIRA:** Allows you to do something you wouldn't normally be able to do — turns your Microdrive into more of a disc drive with random access.

63 **PHILIPS MONITOR:** Competition to win a £300 Philips CM-8533 as first prize to make life brighter.

64 **SPECTRUM MAD CAVERNS:** Karl Jeffery brings you another in our popular unofficial series of games that look like Boulderdash. Ten different screens.

68 **KING BURGER:** You must deal with a hostile fried egg called Freda.

72 **BBC CORE WARS:** How to eat programs. Jon Cottrell.

76 **CBM-64 ROCK FALL:** Paul Hammond brings you a game in which you have to guide a little man around 10 caves, collecting diamonds, dodging rocks. A favourite.

78 **SPECTRUM TURTLES:** No more need you dream of blue turtles, Ian Collier has put flipper to keyboard and brought you a Logo graphics program for the Spectrum.

80 **CBM-64 MACRO-EDITOR:** Define simple one-line Basic routines to help in the development of a program. Geoff Hatto's blow to structured programming.

82 **AMSTRAD CPC-464 TIMEBOMB:** Another Amstrad exclusive. Arnold the Anarchist has blundered in his bomb-planting. C Turner lets you help the cause.

84 **TELSOFT:** Games on our exclusive modem service this month are: CBM-64 Snakes, Basic Macros, BBC Core Wars and King Burger and Spectrum Mad Caverns and Turtles.

86 **CBM-64 SNAKES:** Anders Gustaffson unleashes nine screens of ophiuchan chaos, so lay off the rollmops and get stuck into some nice snake and egg.

91 **FIRST BYTES:** Languages, haywire programs and bluffs.

93 **RESPONSE FRAME:** Tim Hartnell's postbag.

95 **SOFTWARE FILE:** Ten pages of readers' software; fun-packed programs for most home computers, including the Atari, Amstrad, Commodore, Spectrum and ZX-81.

106 **DATEBASE:** Paul Bond rounds up local, national and international micro events — and supplies a list of essential phone numbers.

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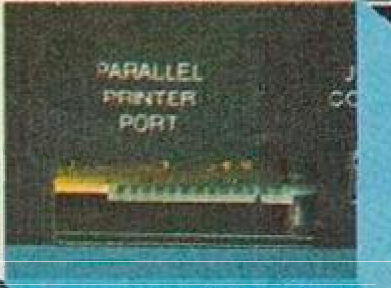


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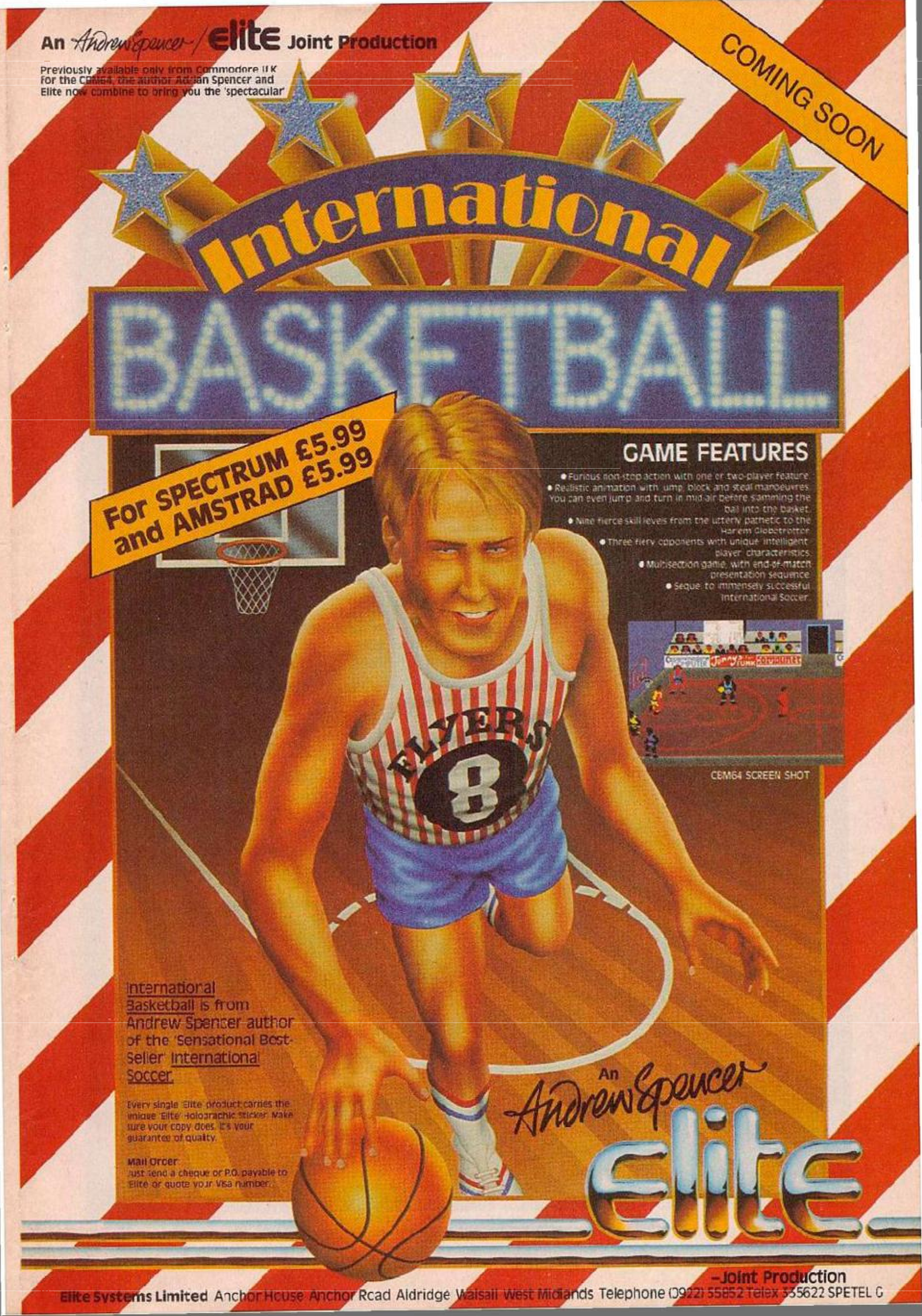
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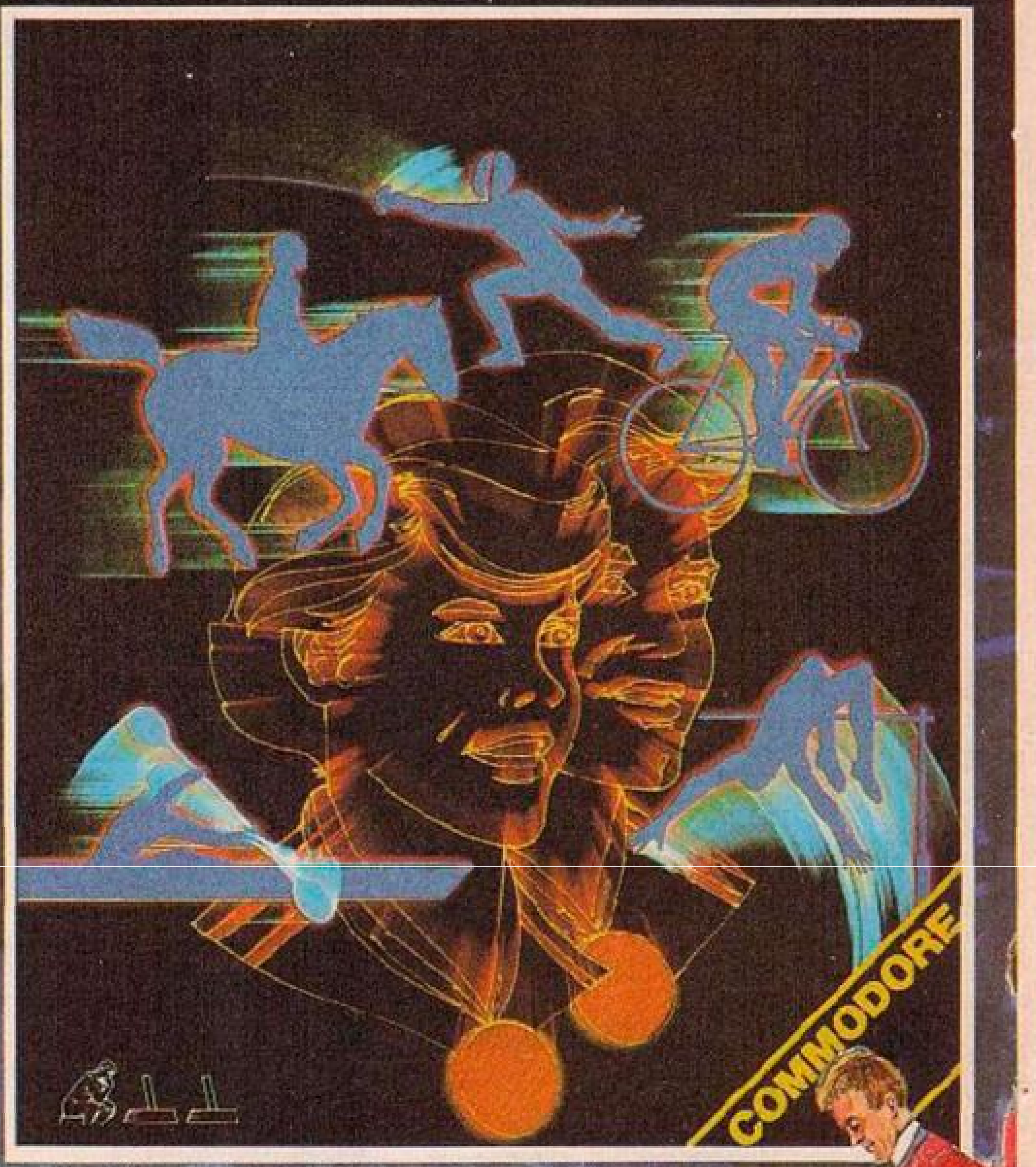
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PROSECUTING SOFTLIFTERS

EX-CHIEF SUPERINTENDENT Bob Hay, billed as the man who helped crack the Iranian Embassy siege, police the Grunwick dispute and quell Sikh unrest in Southall, now faces his toughest case. Software piracy.

He's head of the special unit set up by the Federation Against Software Theft (FAST) to root out infringers of program copyright wherever they lurk. His weapon is the tough new legislation just enacted by Parliament. It will leave software thieves open to punishment identical to the stiff crackdown that hit video pirates a couple of years ago.

If the Copyright (Computer Software) Amendment Act works out as intended, program counterfeiters — already driven out of the video industry — will have to go back to selling Mexican-built "Cartier" watches.

Although the biggest deterrents are reserved for the commercial forgers — up to two years' inside and unlimited fines — anyone selling, exhibiting or even possessing illegal copies could be stung for up to £2,000 or locked up for a maximum of two months, or both.

Thanks to the new Act and the activities of FAST the mood against petty copiers has changed. In last year's anti-piracy campaign software supremo Geoff Brown of US Gold said they should be hanged. Now that the software houses have the power of the Act at their disposal they are aware that the criminal remedy is not always the best option.

People must realise that most copying takes money away from the industry — and that will lead to a loss of software choice and a loss of jobs. In the meantime games houses will have to take whatever action they can to make petty copying as difficult as possible — using protection devices or hardware solutions like Mikro-Gen's Mikro-Plus Interface.

But until computer users become more aware of the damage that making and swapping copies does, it will continue to be a drain on the market. As former Chief Super Bob Hay puts it, the loss of money to producers and retailers is the same whether you shoplift £500 of goods or softlift £500 of games.

Let's hope for the sake of all of us who enjoy computing that the Act will be as effective as its video equivalent. Film companies estimate that video copying is down a massive 60 percent on two years ago.

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"It's OK by me." — Royal assent for piracy bill.

P-DAY FOR PIRATES

SEPTEMBER 16 is P-Day. That's the date when the tough new penalties against piracy come into force.

They are the punishment that anyone charged under the Copyright (Computer Software) Amendment Act will face.

The Act became law in July and aims to hammer all illegal copying of computer software for gain. Summary offences like selling, possessing or exhibiting illegal copies can be hit with fines up to £2,000 or two months' imprisonment or both. Indictable offences can carry up to two years' prison and unlimited fines.

Late kick-off

DESPITE ALL assurances that tough new measures would be introduced following the Brussels disaster, the football season looks like it will kick off without any computerised anti-hooligan entry card systems in place.

The Sperry identify card system, backed by former-Liverpool star Emlyn Hughes, is now no longer being pushed by the company. Sperry had a good response from soccer clubs — Chelsea signed up for a partial system and then pulled out when it was clear that it couldn't be installed in time. But there's been a complete lack of interest from the football authorities.

With the Government pushing hard for entry systems to be installed, but offering no money to help with the expense, the major stumbling block still seems to be cost.



Epson's cut-price entry.

One answer could be a low-cost system like PASS UK, Epson's identity-check scheme, based on a HX-20 portable.

ARRIVA AMIGA!

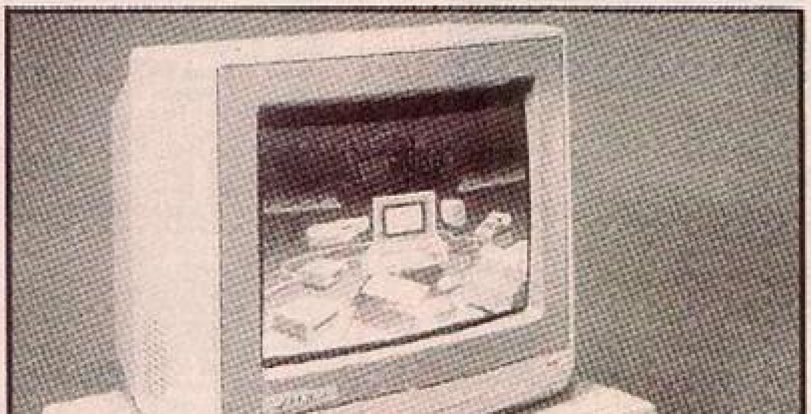
Commodore's 16-blitter

COMMODORE'S ANSWER to the Atari ST, the Amiga, looks like being the one machine everyone will want to own — if they can afford it. Like the ST the Amiga is built around the 68000 processor and has a Macintosh style operating system — written by UK company Metacompo — with icons and windows under mouse control.

Unlike its rival the Amiga is multitasking — it can run more than one program at once. But it is the machine's graphics facility that puts the opposition in the shade. A graphics chip coupled to a high speed bit image manipulator, a blitter, allows the Amiga to draw, shift and transform shapes on screen at a much faster rate than it could with the processor alone.

You can animate figures with just a few lines of code. There are two different types of sprites and a high resolution of 600x200 with 16 colours. The graphics chip is one of the three custom chips that make all the difference to the Amiga. They also give it a very sophisticated sound capability over four channels.

The stock machine comes with a 880K 3.5in. disc drive, 128K Rom and 256K Ram expandable to 512K. When it arrives in this country it could cost as much as £1,250. On top of this owners will need to spend at least £300 more on a high res colour monitor. At these prices you might expect forthcoming software to be mainly business applications. But the graphics potential is so great that software houses are said to be equally enthusiastic about writing games for the Amiga.



Enter the Amiga.

CLIVE-PLUS IS A TV REPAIR MAN



Has Bill Jeffrey more in store for the Spectrum?

SINCLAIR sources do not deny the existence of a 128K Spectrum with a proper sound chip — the AY-38910 used in the Amstrad, MSX and so on. Meanwhile Robert Maxwell's takeover of Sinclair should be completed by the middle of this month and a new chief executive — Bill Jeffrey — to replace Sir Clive has been appointed. Hoover has still not served the writ for £1.5 million against Sir Clive which was issued a month ago in connection with the C5 electric tricycle project.

Bill Jeffrey was head of radar and navigation sales for Mars Electronics until March when he became managing director of Sinclair TV and Communications. Since then the fabled flat screen TV has at last started to appear in the shops in numbers.

Bill Jeffrey would not be specific about future plans for a 128K Spectrum or for next year's portable but he says "we have very exciting plans for the future with our existing products as well as some new ones."

Robcom's CBM-64 cartridge speed up

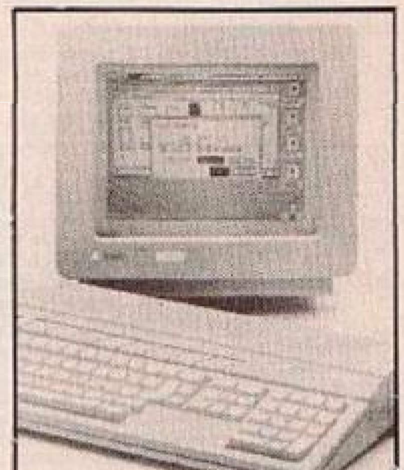
BUY A COMMODORE! On yer bike. Look, you've got to buy a Centronics interface, extra basic, a tape turboloader and a new disk filing system, I mean, that lot'll set you back nearly as much as the machine itself.

Well, not anymore. Robcom's new range of cartridges contain all this and more without even whipping any of the precious user memory. From the basic package at £24.95, right the way up to the all bells and whistles Turbo 50 at £39.95, these packages offer exceptional value for money.

Atari 260ST Tramiel's back in town

ATARI'S JACK Tramiel is returning to these shores in September with the 260ST. The same month the 520 will go on sale to the general public in a package including computer, 500K disc drive, 12 in. black and white monitor and mouse with Gem Write, Gem Paint, Atari Logo and Atari Basic for £750. Over 100 STs are already being used by software houses like Ocean, Firebird and Llamasoft as they race to be first with product for the Atari.

Jack's sprat — the 260ST.



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DIARY

SIR CLIVE'S just back from Mensa's annual bash for those who think they are geniuses. At last year's conference he predicted a world in which people would have to retire in their forties. This year he celebrated his 45th birthday with Maxwell taking over his company and Bill Jeffrey taking over his job. I hope nobody said anything about self-fulfilling prophesies.

INFOCOM who did so well with Hitch Hiker have started sending out interactive press releases. The first page congratulates you on opening the right envelope and by page 2 offers choices such as if you are patient proceed to page 3, if you are not logical proceed to page 4. 4 asks if you are really sure you should have done this before sending you to page 3 or 13. 13 just tells you off for not having any patience before sending you back to 3.

TWO OF OUR rival magazines which we will call Unclear User and Crass — have been having a little legal tangle after Crass made an unsubstantiated suggestion that User might give good reviews on the basis of which software houses placed most advertising. User sent a writ winging over to Crass which forced them to rip the offending pages out of all their issues. Fortunate for User that Imagine refugee Bruce Everiss did not force them to rip up their issues a few months earlier when User printed something about Bruce which Mr Everiss and his lawyer believed was damaging. Instead he accepted an apology and a right to reply in the next issue.

A LITTLE BIRD in a software house rings to tell me that he has been rung up by an ad rep from a magazine — not Crass or Unclear User — and offered a colour page of advertising for nearly £1,000. He refuses so the ad rep drops his price eventually to £500 but the little bird will still not book space. The rep pauses for a second then plays his trump card. "All right £450 — and we'll make your program our game of the month."

Elsie Dee

BAILING OUT
Olivetti runs the RISC

ACORN IS STILL alive and kicking thanks to another cash infusion from Olivetti and some spectacular progress from the research and development teams which has produced a cheap fast new 32-bit chip.

Olivetti now owns 80 percent of Acorn under a deal which has cost Olivetti £4 million, the BBC £2 million in unpaid royalties, and Acorn's other creditors £8 million in bad debts. Brian Long will now take over as managing director with Alex Uboldi helping out temporarily pushing Hermann Hauser and Chris Curry yet further down the pecking order behind Chairman Alex Reid. Brian has been recruited from the Canada Development Investment Corporation.

Meanwhile the stripped down company — down from 450 to 275 staff — has managed to launch a new work station while R&D has announced details of a Reduced Instruction Set Chip.

Companies like IBM have been racing to produce RISCs — which use a small number of instructions in combination rather than having an exhaustive list of specific operations.

This makes the chip smaller — hence cheaper and faster than the existing 32-bit processors.

It will be some time before can incorporate the RISC technology in future models. At the moment they still hope to be able to sell BBC B Pluses at over £400 — when Amstrad can sell a complete 128K system including monitor, disc drive and printer for little more.



Workstation launch shows Acorn is back in business.

128 GUNFIGHT AT THE UK CORRAL



Commodore 128 pitches in at £269.

ENTERPRISE is finding Commodore a tough opponent in the 128K micro war. Commodore is pricing the 128 at £269 and releasing it now with a plan to spend £5 million advertising the CBM128 as the perfect machine for class of 82/83 who bought a Spectrum or CBM 64 and now want to upgrade.

Commodore is discounting fears that "clever" software which makes unorthodox use of the 64's video chips may not be fully compatible. So far few American software houses are making use of the 128 mode — preferring to write for the 3 million 64s rather than bring out specific versions for the initially small number of 128s. But the real threat to Commodore, Enterprise and Atari in the 128 stakes is the new Amstrad CPC 6128 — (exclusive review page 40) at £300 including drive and monitor.

UPDATE

OLD GAMES for new, conversions are a good way for games publishers strapped for cash to make a quick buck or two. They are also nice little earners for the small software houses given the spade work of conversion whilst the original program's authors go on to pastures new.

U.S. Gold is going for the Amstrad in a big way. *Beach Head II, Pole Position, Up 'n' Down, Buck Rogers, Congo Bongo, Dambusters* and *Bounty Bob Strikes Back* are amongst the games due to have the dust knocked off them. The even older *Beach Head* is opening several new fronts on the Amstrad, BBC, Electron and Enterprise.

Following the success of the Softaid compilation, Virgin has decided to pull together a tape containing a number of titles from various software houses. Called *Now Games*, just to make sure no-one thinks they're buying a compilation LP, it contains *Lords of Midnight, Everyone's a Wally, Strangeloop, Brian Bloodaxe, The Arabian Nights* and *Falcon Patrol II*.

Virgin is promising to bring the pzazz and advertising clout normally associated with music compilations to this new venture. They may not be alone in the field for long however. U.S. Gold is also busy compiling.

Virgin has also revamped and relaunched *Sorcery*, bigger and better they say, on the Commodore, presumably with an Amstrad version hard on its heels. This follows up Software Project's successful relaunch of *Jet Set Willy* by cramming nearly twice as many rooms in it. Is this a trend other platform adventure hits will follow?

CCS has converted *Arnhem* for the Amstrad. For £9.95 you can go a bridge too far. Also Palace are bringing out *Cauldron* for the same machine. Never one to miss a bandwagon when they see one, Firebird are getting in to the conversion market with old Ultimate hits, *Underwurlde* and *Sabrewulf*, as well as revamping their Silver range to include some new Isomorphic (à la Alien 8) games.

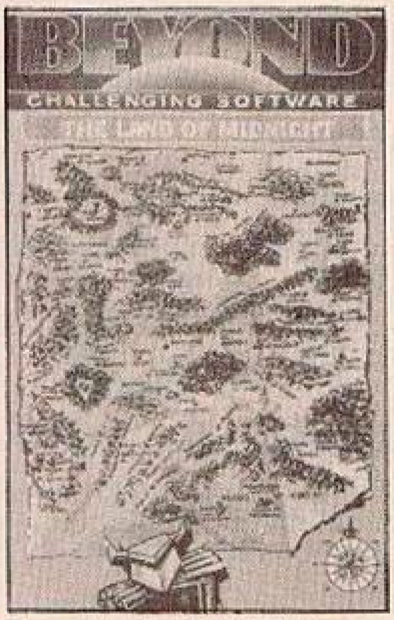
IRON HEROES

Beyond Superman at Denton

IS IT A BIRD? Is it a plane? You'll be seeing a lot of this sort of thing when First Star's Superman game is released for distribution in the UK by Beyond. But though it's a graphically strong arcade action game, Beyond are even more fired up about the home-grown products.

Sequels are well to the fore — though Eye of the Moon scheduled to retail at £9.95 on the Spectrum has been delayed. The final part of the Tolkienesque Lords of Midnight trilogy, it would have been cast more in the mould of an adventure with less emphasis on strategy.

Follow-up to icon-driven Shadowfire is called Enigmaforce and features Zark, Sylk, Maul and the lovely Serena — "We put her in because it seemed a bit one-sided otherwise," say programmers at Denton Designs. Set in a complex on Sylk's home planet, it moves beyond mere icon control, insofar as you can do a mindprobe and "become your character", going round the screen performing various tasks. Sounds like a game that could really take you out of yourself. Not bad at £9.95 on Spectrum and Commodore 64.



Beyond Lords of Midnight.

Liverpool trendsetters Denton are also working on a futuristic — and violent — sports game for Beyond, tentatively called Iron Heroes. "Rather than take a sport and turn it into a computer game, we took a computer game and turned it into a sport". The result, an all-action graphic game will also be out at £9.95 for Spectrum and CBM-64, this time on Beyond's new Monolith label.

Billed as a 10-hour Megathon, Quake Minus One has certainly got programmers Mike Singleton and Warren Foulkes so bogged down that Beyond have been forced to shelve long-awaited Lords of Midnight sequel Eye of the Moon. In Quake, the Robot Liberation Front demand freedom of thought and association for droids. They seize control of the Titan Undersea Power Station and hold humanity to ransom. With animated landscaping or "Actionscape", Beyond are confident that this game, along with all their new titles present techniques which will set the trend for 1986 computer games.

The game that people in the know are really excited about is Nexus, it's even got it's own label — called Nexus. So good they named it twice, this will be a graphics adventure along similar lines to Enigmaforce with digitised graphics and maximum payability.

NO STRINGS ON FIREBIRD



Thunderbirds are go again.

STAND BY for action — Firebird, British Telecom's leisure software house, has bought the rights to '60s TV puppet series Thunderbirds. The series is a favourite of Firebird supremos Herbert Wright and Phil Pratt. "It's my favourite, too", says Gerry Anderson, creator not only of Thunderbirds, but Stingray, Supercar, Fireball XL5 and, currently, Terrahawks. CRL computerised the latter in a small way — "but this is the first major one".

Filmation II the Ultimate sensation

SKELETONS with rotting flesh waiting, prowling — not Saturday night in Milton Keynes but the village of Nightshade, location of Ultimate's new "Advanced Home Computer Action Adventure Simulation". Utilising Filmation II, a technique ensuring fast smooth action, the £9.95 game for 48K Spectrum emerges along with Blackwyche for CBM-64.

Novagen's Mercenary

Freedom of choice is the keynote of Novagen's 3D vector graphic games, billed as a cross between Elite and Solo Flight. But don't let that put you off as word has it that these are some of the fastest-moving wire-frame graphics around as the mercenary searches planet Targ looking for energy crystals.

POP★ TOPS

TOP 20

1	Hyper Sports	Imagine	Sp
2	Shadow Fire	Beyond	Sp/64
3	Dun Darach	Gargoyle	Sp
4	Way of the Exploding Fist	Melbourne House	64
5	Don't buy this	Firebird	Sp
6	Cauldron	Palace	Sp
7	Grand National	Elite	Sp
8	Softaid	Ethiopia Appeal	Sp
9	Rocky	Firebird	Sp
10	Arnhem	CCS	Sp
11	Desert Burner	Sparklers	Sp
12	Graham Gooche's Test Cricket	Audiogenic	64
13	The Fourth Protocol	Hutchinson	Sp
14	Nodes of Yesod	Odin	Sp
15	The Rocky Horror Show	CRL	Sp
16	World Series Baseball	Imagine	Sp
17	Quackshot	Sparklers	Sp
18	Starion	Melbourne House	Sp
19	Thing on a String	Gremlin	64
20	View to a Kill	Domark	Sp

Source: WH Smith
Sp = Spectrum: 64 = CBM 64

TOP 3 BY MACHINE

1	Rockman	M. Tronic	Vc
2	Doodlebug	M. Tronic	Vc
3	R.I.P.	M. Tronic	Vc
1	Action Biker	M. Tronic	64
2	Kikstart	M. Tronic	64
3	Way of Exploding Fist	Melbourne House	64
1	Action Biker	M. Tronic	Sp
2	Hyper Sports	Imagine	Sp
3	Fingers Keepers	M. Tronic	Sp
1	Repton	Superior	Bc
2	Lode Runner	Software Projects	Bc
3	Revs	Acorn	Bc
1	Airwolf	Elite	At
2	Drop Zone	US Gold	At
3	Bruce Lee	US Gold	At
1	Sword of Destiny	Gremlin	16
2	BMX Racers	M. Tronic	*16
3	Airwolf	Elite	16
1	Repton	Superior	El
2	Overdrive	Superior	El
3	Football Manager	Addictive	El
1	Mordons Quest	Melbourne House	Am
2	Dun Darach	Gargoyle	Am
3	Rocky Horror Show	Computer Rentals	Am
1	Fingers Keepers	M. Tronic	Ms
2	Chiller	M. Tronic	Ms
3	Crazy Golf	Mr Micro	Ms

Source: Websters Software
Vc = Vic 20: 64 = CBM 64:
Sp = Spectrum: Bc = BBC:
At = Atari: 16 = CBM 16:
El = Electron: Am = Amstrad:
Ms = MSX.

YOUR Letters



Your Computer now has its own Prestel Mailbox. Our number is 019991800. If you have any program enquiries send us a message. We will try and give you an answer within a few days.

"GOOD VALUE"

YOUR NEWS story in the June issue about the new Acorn BBC B+ complains at the £499 price tag but if you consider what you get for £499 it is a different matter:

BBC Micro Model B	£330
Aries B20 Board	£100
Rom Expansion Board	£ 55
Acorn DNFS 1.2	£100
TOTAL	£585

Your basic BBC B has five Rom slots of 16K each, whereas the BBC B+ has six Rom slots of 32K each giving an extra 112K of Rom space! However in the BBC 3 you loose two 16K Rom slots for the Basic and O.S. Roms leaving you with only 48K of Rom space. In the BBC B+ you loose one 32K Rom slot leaving you with 160K of Rom space! Secondly, the DFS is the new 2.1 version with a 1770 controller chip. There is also an extra 12K of Ram spare which nobody at Acorn can decide what to do with, but no doubt somebody will find a use for it.

Buying a BBC+ saves you £85 on the price of upgrading a BBC B. This must be considered a bargain and not, as one reviewer claimed, £170 for an extra 32K Ram. I give it an A+ not a D−!

Chris Armes,
Stockport,
Cheshire.

MICRONETTING

I RECENTLY won a Prism VTX 5000 Modem in a competition organised by British Telecom. Since then the strings of G.T's Micronet 800 have been slowly but relentlessly closing around me.

It is true that by using the downloader program published in *Your Computer* I have been able to receive a number of excellent programs on your Telsoft service. But where do we go from there? To download six programs took less than an hour, even though it was spread over two days because of the staggered transmission times. Now I can expect, at most, two or three new programs each month from Telsoft. This would mean that the modem was used for about five or six hours each year.

So why not join Micronet 800? "One pound a month and the cost of a local telephone call" is B.T.'s advertising slogan. What is not mentioned is the fact that you must take out a year's subscription which is subject to V.A.T. As a youngster, some years ago, I was persuaded by a man on the local market into paying half-a-crown for an envelope into which I had seen him place a gold watch. It turned out that my envelope contained a packet of razor blades worth six old pence. Since then I have been very wary of people who want to sell me something without letting me see it first; particularly when it is going to cost me £59.80 plus telephone charges.

So who needs Micronet 800 when there are all those independent bulletin boards waiting to welcome me? Surely the VTX 5000 instruction manual would give me the information I required? Oh dear! The manual deals exclusively with accessing Micronet 800. The answer was obviously to write to Prism and ask for more details. Just to be sure I also wrote to the firm Modem House who were advertising user to user and bulletin board software for the VTX 5000. The day after sending the letters I read that both the manufacturers of the modem and Prism were defunct and that Modem House had taken over the distribution. So what arrived through the post from Modem House? Yes, you guessed it, more advertising material for Micronet 800.

A visit to the local library provided a list of bulletin board telephone numbers and the disturbing information that most of them operated on a 300/300 baud system. The VTX 5000 operates on a 1200/75 system. I also found that I would need special software and would in some cases have to pay to access the 1200/75 system that existed. What is more most of these operators seemed to be located at the other end of the country. What price the "cost of a local call"?

R. Houlton,
St. Helens,
Merseyside.

"QL IS OK"

HAVING JUST READ the July edition of *Your Computer*, and flicked the pages to the Atari review, I have a question to ask. Quite simply it is: Why does Kathleen Peel despise the QL? Since this excellent machine appeared on the market, she has been giving the machine a hell of a slating. In any reviews or comparisons of machines in your magazine, I have always been impressed by how fair the writer has been in picking out the good points, but also the bad ones. Kathleen Peel, however, seems to be extremely happy to pick out only the bad points of the QL. For example, in the review in the July 1984 edition:

"... loading times, these figures are in no way good enough". "There are a number of notable omissions from the list of keywords, the ones I found most irritating were On Error and Rename". "The output was extremely difficult to format ..."

The list could go on and on, but these are just three. I have chosen at random. In the Microdrive loading times section, she said that the Microdrives were just not comparable with disc drives. This is a rather stupid statement as Microdrives are only designed to load and save programs faster than cassette! All "tape drives" are slower than discs! As for the omissions of the two keywords, all I can say is "so what?". I use a Beeb at school for my A level computer science course, and I have only used "On Error" a handful of times and "Rename" only once. Their omissions from the machine appears to me as being no great loss.

In the Atari review, she says in the Opposition box: "Adequate software". "Adding a black and white monitor and 512K Ram expansion takes you up to £800". "On that basis, not worth thinking about".

Good God! She rates machines such as the IBM PC, Apple Macintosh and Apricot FII higher than the QL! How on earth can you compare a £400 machine with those costing over £600! OK, I admit it, I myself think the Atari ST range will be tough competition, but it has taken Uncle Clive's QL to give the computer industry the kick in the groin needed to get home computers out of the old 8-bit forest. Let's all face it, if the QL had been an 8-bit machine, the new STs and the Commodore Amiga would probably be

(continued on page 21)

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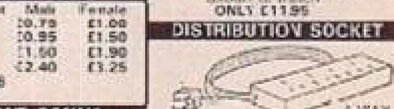
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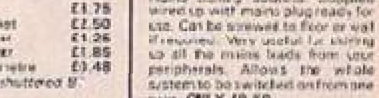
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20-way	£1.40	£1.60
26-way	£1.70	£1.85
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IN ★ TOUCH

How to write for *Your Computer*

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC — and soon the Commodore — which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068. No more lonely nights typing in endless pages of hex digits.

Message service

You can get messages to us in two ways. Either use the Frestel Telex Link to 892084 BISPRES G or you can use our very own modem, day or night on 01-661 8978. The modem is V21, 300 baud, even parity, 10 bits per character. You simply transmit in upper case "YRC" — our address code, and wait for the acceptance code "+ + + STF GO". Then off you go. Don't forget to tell us who it's for. Sign off with "NNNN" — again in upper case.

YOUR Letters

(continued from page 19)

8-bitters also. I do not as yet own a QL, but I am considering it among a list of others, and so far it is top of the list.

What I would like to read now is Kathleen Peel's review of the BBC B+. Almost certainly it would be along the lines of "excellent value for your £500, On Error and Rename commands supplied, 64K Ram, built in DFS".

It would probably not mention the fact that at £399 the existing BBC B is considered over-priced, nor the fact that the machine is still 8-bit, nor the fact that some existing disc-based games may not run because of a difference in the chips used.

If it weren't for Uncle Clive and his innovations, we'd all be sitting out here waiting eagerly for the sixteenth "—" version of our 8-bit machines, wishing someone would be brave and go into 16 or 32 bits for a change . . .

Colin Grant,
Newcastle upon Tyne.

HATCHED FILL

THE HATCH FILL routine for the Spectrum in the August issue of *Your Computer* by A.J. Renton, is a very useful routine. I would like to point out that it is not necessary to use the first User Defined Graphic each time.

The routine uses the byte value at address 23675 which points to the first UDG — see manual — and is normally set at 38. By Poking this address with another value the routine can be made to use any of the UDGs. The value Poked needs to be divisible by eight to capture the first byte of the UDG but intermediate values may be Poked to vary the choice of patterns. For example

POKE 23675,93

will produce a hatched pattern using the last three bytes of graphic "A" and the first five bytes of graphic "B".

Extra patterns can be produced by calling the routine more than once with 23675 Poked with different values each time. As an extra bonus any eight byte sequence in the Spectrum memory can be printed as a pattern by Poking 23675 and 23676 with suitable values to point at the required address.

To avoid complications reset the variable area to normal when not using the Hatch routine, i.e.

POKE 23675, 88: POKE 23676, 255.

Keith Selby,
Old Coulsdon,
Surrey.

SPRITE DESIGN

IN R. Newman's Spectrum Sprites program that appeared in the June 1985 issue of *Your Computer*, there is a sprite designing program. Unfortunately, due to the use of the In command, it has been rendered unusable by model 3 owners. Up until now that is. The secret is to take 64 from any In results. Therefore to alter the sprite designer to run on a model 3 Spectrum.

Line	Appears in Frog as:	Change to
3060	255	191
3065	251	187
3000	251	187
3080	243	179
3080	235	171
3085	254	190
3090	239	175
3100	251	187
3105	247	183
3110	239	175
3115	243	179
3120	235	171

For example

3100 If a = 251 THEN LET X2=X1+(X1 15) should be
3100 If a = 187 THEN LET X2=X1+(X1 15)

Jon Ross,
Bognor Regis,
Sussex.

A CHILDS' VIEW OF LOOPING THE LOOP

I SIMPLY cannot let Geoffrey Childs' letter in the July issue stand uncorrected.

The first thing that a beginner should learn about loops is that you should not jump into them. Jumping out of them is not only legal but often necessary, as when searching an array for some target element.

It is true that many versions of Basic cause problems when one jumps out of a loop. However, this is a bug in Basic — see my article, "A Bug in Basic", which appeared in the American magazine *BYTE*, January 1981. It is not in Fortran, Pascal, C, or other higher-level languages.

The line L = 10 which Childs cites is a line which, although it is allowed in Basic — which does not check such things — violates a rule of almost every other higher level language; namely, that in a loop for "variable" from "minimum" to "maximum" one must not change the values of either "variable" or "maximum" inside the loop; if one does, then unpredictable behaviour may result.

If you have a version of Basic with the bug, the best way to avoid it is to "write out" your For loops without the For statement. That is, instead of

For I = M TO N:code:NEXT I,

write

I = M:"label" code:I = I + 1:IF I< = N THEN "label".

Instead of

FOR I = M TO N STEP J:code: NEXT I

write

I = M:"label" code: I = I + J:IF I< = THEN "label".

It's true that if you do this you are using an extra Goto statement. But if you're avoiding Goto statement, use Pascal in the first place, or Simons Basic.

Douglas Maurer,
George Washington University, USA.





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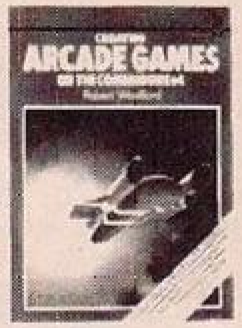
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The book also includes a fully annotated, complete arcade game listing.

Creating Arcade Games on the Commodore 64 by Robert Woolford (ISBN 0 907563 75 9) is £7.95, and is available at most book and computer stores, or directly from the publishers, post free:

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Interface

Star★chart

KEY

★★★★★ Best of its type
★★★★ Very good
★★★ Good
★★ Average
★ Below par

Frankie Goes To Hollywood

CBM-64
Ocean
Adventure
£9.95

★★★★★

Extensively previewed in our June issue, the game has deigned to come on to the market at last, but it's just as good and revolutionary as when we raved about it last time. You have to solve a murder mystery and strive to become a complete person. The music is excellent and the use of window graphics is superb. Frankie Goes To Hollywood may be last year's model as a band, but the game will definitely run and run.

Repton

BBC
Superior Software
Arcade Adventure
£9.95

★★★

Just as every Western is said to be a variation on one of seven basic plots, so new computer games usually just ring the changes on a handful of familiar game concepts. Repton is a case in point. It contains elements of Dig-Dug, Boulderdash, and maze games, wrapped up in an arcade adventure format.

The game is also on an impressively large scale. There are 12 levels and on each the screen scrolls in four directions over an area 16 times it size. You have to tunnel through the earth collecting diamonds. But as you do so you dislodge boulders which invariably tumble down to trap you or seal off a vital passage.

Fortunately at any point in the game you can consult a map.

All these features add up to produce a highly playable game.

SOFTWARE Shortlist

Mig Alley Ace

- *CBM-64*
- *U.S. Gold*
- *Simulator*
- *£15*

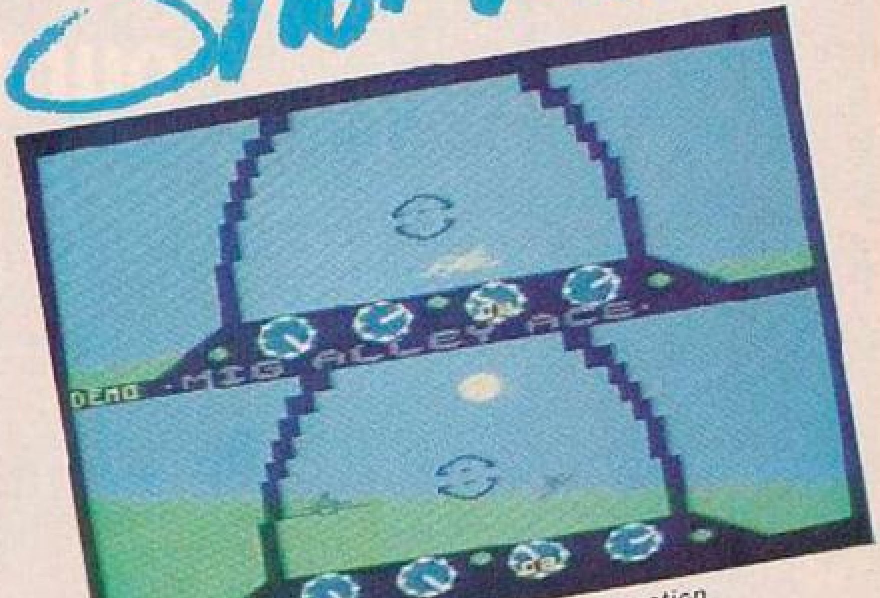
★★★★★

THERE'S ONLY one thing better than blowing away a computer-controlled plane and that's blowing away a plane controlled by a human opponent. Introduce the element of competition in a computer game, and you're on to a winner. No more arguments about high scores made at one in the morning after five hours play, in Mig Alley Ace reputations are made where it counts: head to head.

The game is all about air combat over Korea. The name comes from the area between the Yalu river and the 38th parallel; it was a place where a pilot picked his fights carefully, if you didn't like the odds, you get the hell out, at least the pilots that survived did.

In the game, the screen is split into two, each half giving an out of the cockpit view with some rudimentary instruments. Each player uses a joystick to control his aircraft, plus keyboard controls for throttle and bail out.

There are three different ways you can play the game: single player for practice, two player co-operative or head to head. You can add computer controlled aircraft to taste: if you're feeling sadistic you can gang up on the computer two to one. After you've decided the sides, there are five scenarios to choose from including choosing bombers, fighters or transports, altitude, night or day.



Mig Alley Ace: split screen gives twice the action.

Each side starts off with three lives, which are lost if you crash, get shot down or bail out unsuccessfully. You get points for planes shot down depending on the difficulty level you set yourself: the harder the task, the more points you get. So much for the bald facts, what's it like to play? My favourite is head to head with an extra computer controlled wingman each.

The game makes no pretence of simulating flying a Sabre or Mig, it concentrates on the all-important matter of getting your opponent in your sights and keeping him there long enough to blow him away. Whilst not detailed, it is superbly accurate. From tight turning on the edge of a stall to aiming off with your cannon to allow for gravity and the enemy's movement.

It's unfortunate that player one can only operate his throttle if player two is prepared to let go of his joystick.

Another problem is getting used to the way other planes are displayed. This is fairly rudimentary and is based on their respective ranges and attitudes.

This is a game that will instantly appeal to the simulator buff. For the novice, it's going to be a rough, one-way ride to oblivion, at least to start with. But persevere, and find out if you've got "the right stuff".

... BEHIND THE SCREENS ... BEHIND THE SCREENS

IF YOU'RE LOOKING for a flight simulator, then look no further than Microprose. A small outfit set up two years ago, they've built up a solid reputation under the driving force of ex-fighter pilot "Wild Bill" Stealey and now have over eight per cent of the U.S. market.

Andy Hollis met Bill when they both worked for General Instrument Corporation and, soon after Bill formed the company with Sid Meyer, Andy started moonlighting for the company, working on Mig Alley for the Atari. "I first got interested in computers at college whilst majoring in mathematics. I got an Atari video console and really got hooked on Breakout. It's been downhill ever since. Mig Alley was always a compromise between realism and playability.

"I wanted it to be fun to play but still make the fighters handle accurately. I used plenty of ideas from Sid Meyer and his work on Hellcat Ace."

Andy Hollis: "It's been downhill ever since."



But Mig Alley was a far greater challenge — over three times as much mathematics was required to get the planes moving relative to one another. "My current favourite game is the one I'm working on right now. It's called Gunship. I really don't get much time to fool around with the other stuff that's on the market." Gunship promises to break new ground in simulator graphics with realistic motion of buildings as you skim along the tree tops.

Andy wouldn't reveal if he'd ever succeeded in shooting down his fighter pilot boss but then it pays to let your company president win now and again.

Lee Paddon

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SOFTWARE Shortlist

Star★chart

Southern Belle

Spectrum 48K
Hewson Consultants
Simulator
£7.95

★★★★

The golden age of steam is dragged kicking and screaming into the digital age of the micro. All aboard, the whistle blows, and the mighty Southern Belle pulls out of Victoria on its way to Brighton with you at the controls.

You take the part of an engineer, with the computer holding your hand to start off with; as your confidence grows, you can take on harder and harder runs, and use more of the controls. What will make this game a huge hit with the steam fraternity is the "chrome", with perspective line drawings of all major trackside features. Unique idea, superbly executed.

War Zone

Amstrad
CCS
Wargame
£7.95

★★★

Capable conversion of the Spectrum game, abstract war game, you versus computer with artillery, tanks and infantry. Move, fire and melee in an attempt to invade the enemy heartland before he does the same to you.

April Showers

BBC
Bevan Technology
Dodge about
£2.50

★★★

You are a cloud — well, why not. Your task for the day is to avoid evaporating by crashing into other clouds and raindrops, whilst keeping a delicate little bloom from wilting under the barrage of the hot sun and hordes of umbrellas. If you manage to fend off the offending umbrellas, on to the next day. The graphics are colourful with some nice touches, like the pair of eyes in the cloud which look in the direction it's moving.

Beach-head II

- *CBM-64*
- *US Gold*
- *Combat simulation*
- *£14.95*

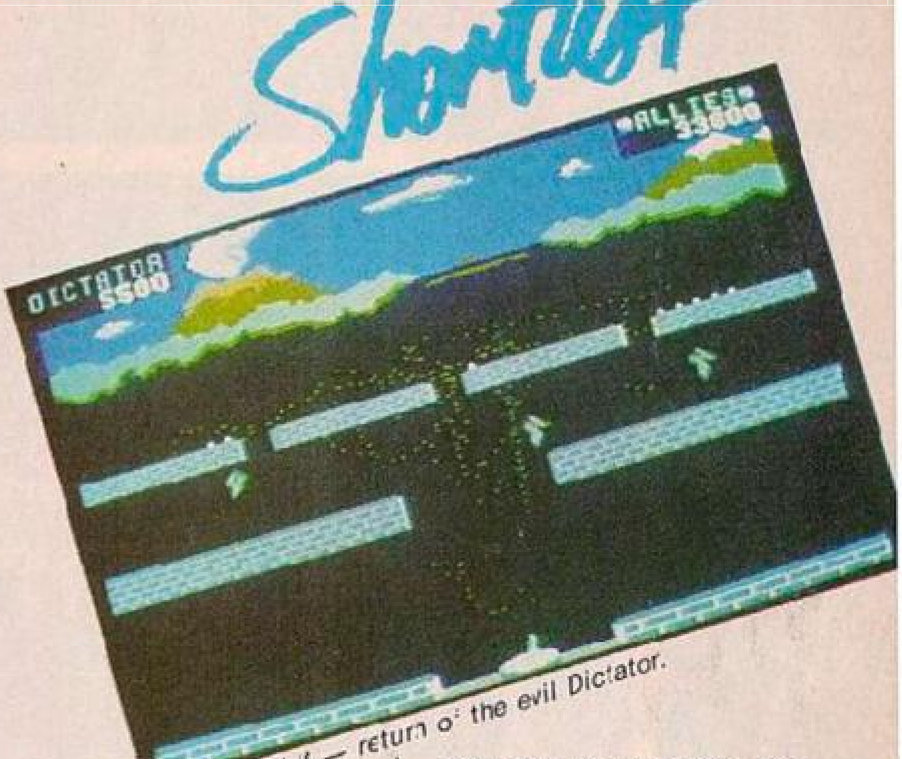
★★★

STORIES FOR BOYS — in the tradition of War Picture Library comic books, the soldiers in this follow-up to US Gold's blockbuster Beach-head cry "Argh!", "I'm hit!" and "Medic!" when they get blown away.

Beach-head II is a two-player game, which you can play against another human, or the computer.

The first scenario, "Attack", pits a detachment of chopper-borne paratroops versus the dictator's machine gun emplacement. If you are in command of the attacking force, you start off controlling the helicopter. Make sure you don't come in too low, or you'll kill your troops when you drop them — this is done by pressing the fire-button. They hide behind a wall with three gaps in it. Both sides of the gaps flash periodically, and if you hit the fire-button, troops move out in pairs from that side. Usually one soldier seems to be under your control, while the other has a mind of his own, and acts as a decoy.

One man may throw himself over the second wall while another emerges from the sole central gap in this wall to make a frontal assault with hand grenades.



Beach-head II — return of the evil Dictator.

In the second scenario, "Rescue", some pretty bizarre things appear to be going on, but basically, if you were in control of the troops before, you should now have control of the machine gun emplacement. Your job is to cover your hostages as they escape from the Dictator's fortress.

The third scenario "Escape" involves flying a helicopter up a roadway with things firing at you.

An enjoyable game which should keep the kids away from tearing the legs off insects or teaching the cat to fly, but for my money the first scenario is the one which will get played most. £14.95 on disc, £9.95 on cassette.

Paul Bond

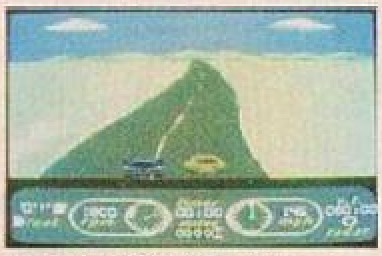
Great American Cross Country Road Race

- *CBM-64*
- *Activision*
- *Road racing*
- *£9.99*

★★★

THIS MAY BE THE computer game with the longest name in the world. It may be, as one American newspaper has it "Cannonball Run on a Home computer". Burt Reynolds may have his doubts. At first glance the main game is a little like Audiogenic's Talladega. But there is plenty of geographical and chronological variation — it gets darker as the day wears on, and some nice additions.

You can, for example, race from San Francisco to Washington, Los Angeles to New York, Seattle to Miami, or there is even a U.S. tour. Once you have selected a route the map screen pops up, allowing you to check where you're going and what the weather is going to be like. So if you drive up on the Range, Minnesota way, you tend to


Longest race: longest name.

get snow, but other scenarios take you through desert and plains.

You have a certain amount of time to complete each leg of a race. If you go too fast you attract the attention of the highway patrol and get flagged down. Also you must keep your eye on the gear shift as the RPM increases, the car's engine whine gets higher — if you let the tachometer reading get too high without slowing down and shifting gears — the engine blows, and you have to "push" it to the next gas station, using the fire button.

The facility to down-load games so that you can build up a file of fields to race against is a nice touch. A nasty touch is that it's very easy to drive past gas stations you really wanted to stop at. People playing the forthcoming European Road Race from the same company will doubtless have a "Sacre bleu!" option for this eventuality.

Paul Bond

Juggernaut

- *Spectrum*
- *CRL*
- *Truck simulator*
- *£7.95*

★★★

TIME TO dig out them Faron Young records and settle down to a little silicon truckin' on the Spectrum. Believe it or not this is an articulated lorry simulator. Better yet, it's icon-driven.

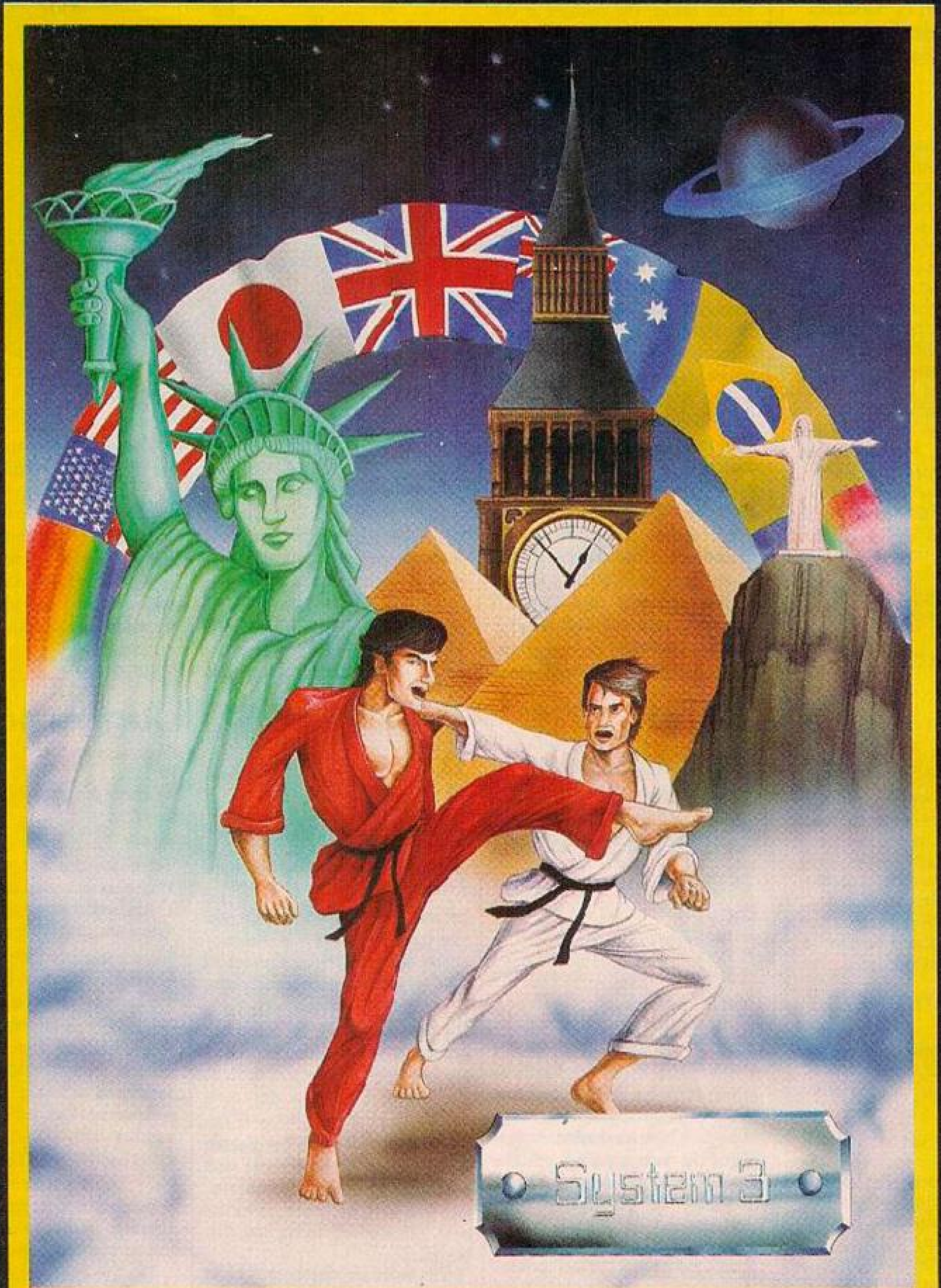
The entry screen is divided into two sections — driving information at the top and five icons at the bottom. The driving display has dashboard data like fuel, speed, distance travelled and time elapsed, together with a stylised steering wheel and joystick. There are some traffic lights represented here, too — points are given against you for jumping traffic lights, speeding and damage done to the lorry.

The five icons enable you to redefine the keys, see hi-score, practice, change the size of your lorry or just drive.

A nice idea, could have been more smoothly implemented for this price, and a third and a fourth gear would have made it a useful driving simulator. But still, loads of fun, so keep on trucking, CRL.

Paul Bond

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Star★ chart

3D Voice Chess

Amstrad
CP Software
Chess Game
£12.95
★★★

Amstrad conversion of successful Spectrum game, this version also features "speech" and a 3D perspective view of the game like the recent Psion QL chess game. After you've turned the sound down to get rid of the speech, it plays a competent, if rather uninspired game. Book openings, hints and editing are available with seven levels of play.

Grand Prix Rally II

Amstrad
Amsoft
Motor racing
£8.95
★★

On a planet long ago lived a race of people so amazingly primitive they thought Pole Position was a really neat game. Well, this is worse. Take Pole Position, throw out most of the scenery, most of the cars, the smooth scrolling and the time/speed display and you get the idea of this one. Only for those sincerely desperate to burn some rubber on their Amstrad. One shudders to think what the first bite at the cherry must have been like.

Cryptamania

BBC B
Black Knight
Arcade type adventure
£6.95
★★

Armed with a laser, you traverse a crypt's tight-fitting passages in search of four keys to freedom. However, there are more complex crypts and hideous nasties beyond which they'll try their best to hinder you. The graphics are clear but simple and a little originality would have helped, but interesting to play if only to find out what's in the next crypt.

Rocco

- *Spectrum*
- *Gremlin Graphics*
- *Boxing simulation*
- *£7.95*

★★★

"I COULD HAVE been a contender!": you may feel tempted to echo Marlon Brando's words in *On the Waterfront* as you stumble bloodied but unbowed away from the keyboard.

Not exactly good clean fun, Rocco consists of punching four different boxers in your struggle to become champion of the world. The graphics are excellent, even if it is a little disturbing to see this sort of thing portrayed in such gruesome detail. However, this game is certainly a feather in Gremlin Graphics' cap.

The game, originally produced by Dinamic Software, has fallen foul of Sylvester Stallone insofar as it was originally named Rocky — but you don't argue with copyright or Rambo, it would seem.

To beat your opponent, you must knock him down three times. So much simpler than the comparable Frank Bruno game and much more satisfyingly brutal for those used to having large amounts of sand kicked in their faces.

Paul Bond

Frank Bruno's Boxing

- *CBM-64*
- *Elite Systems*
- *Sport simulation*
- *£6.95*

★★★

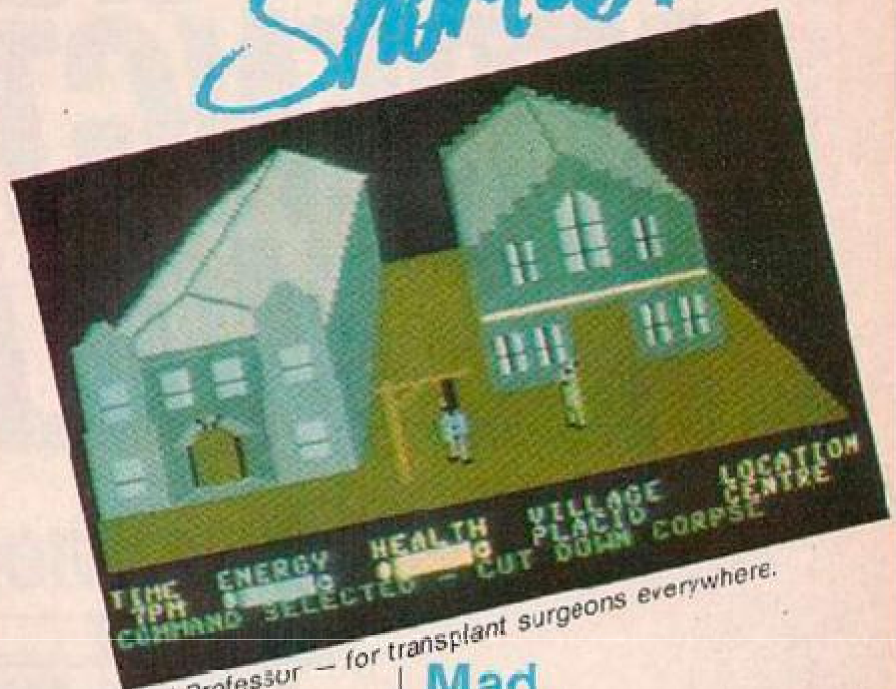
YOU CAN DUCK, dodge left, dodge right as well as landing right and left punches on your opponent's jaw. When the KO sign is flashing you can land a right hook/uppercut depending on whether your guard is up or down. Whether you make body blows or head blows is determined in the same way.

All of which makes Frank Bruno's boxing technically a more sophisticated game than Rocco, the other contender in the boxing stakes this month. If you win the bout you get a secret code which enables you to go on and load in the next boxer. You have to take on

Frank Bruno: Well, Harry . . .

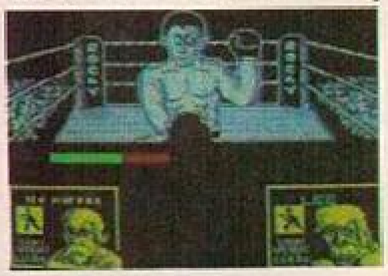


SOFTWARE *Shortlist*



Mad Professor — for transplant surgeons everywhere.

Rocco: Don't mess with Rocky



eight boxers as opposed to the four in Gremlin's Rocco in order to become heavyweight champion of the world. Each of the boxers has a different fighting style.

Yet somehow the game doesn't succeed graphically in the way Rocco does. Punches don't produce the same squelching effect on your opponent, and your first opponent the Canadian Crusher, could be anything from a gorilla to a barrage balloon.

The screen is divided into two main sections. The upper half shows fight time, score and bonus — together with Bruno's status. The lower half shows a perspective view of the ring. It's fairly easy to defeat the Canadian Crusher, sometimes you can knock him out with just left and right jabs. I'm not totally convinced about the difference between head blows and body blows. It seems to be largely a random piece of luck if your blows have any effect.

The eight boxers are all fantasy characters laden with boring old national stereotyping. Ravioli Mafiosi (Italy) knows all the dirty tricks and uses them without a care in the world. That's not going to endear us to any computer users in Turin, is it?

Paul Bond

Mad Professor

- *CBM-64*
- *Creative Sparks*
- *Arcade adventure*
- *£7.95*

★★★

THIS IS AN adventure game for people who hate adventure games. You don't have to key in a wide variety of commands only to be told that you died of hunger and thirst while still on the first screen. By pushing the joystick forward and back you scroll through the commands necessary to the particular part of the scenario that you are inhabiting. Push the joystick left and press the fire button to execute the command. You'd have to be a real dummy to die on the first screen of this game. The graphics may not be exactly luxurious, but they're a passable 3-D.

You wake up in your castle, Schloss Strudelberg — where you as Franz Johann Blockenspiel the Mad Doctor are free to carry on with your gruesome hobby, reanimation of dead tissue with a view to constructing an artificial human.

There is a map screen showing the layout of the village near your castle: there are six main areas; the castle, the dwellings, Lightning Hill — a good place to zap some energy into your necro-android — the village centre near the police station, the forest and the graveyard.

The aim of the game is obviously fairly unpleasant. Of course you can construct a fair amount of your creature from dead

(continued on page 29)

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Star★chart

Confidential

Spectrum
Radar Games
£6.95

★★★

Another Quilled adventure, Confidential casts you in the role of a private investigator in a small coastal town.

The adventure has some neat touches. The persistent ringing tone in your office — the Craig Adams Detective Agency — at the start of the game is one. Others include the attractively presented text, with use of some small graphics, and the inclusion of a detailed street map.

You are called out to the home of a woman who badly needs your assistance. Getting there is not too difficult provided you don't try to walk the eight or so miles. Once you've arrived at the distraught lady's house, you'll discover that this is going to be a search for a missing husband.

An enjoyable adventure but not an easy game to solve.

St Crippens

Spectrum
Sparklers
Adventure
£2.50

★★★

Value for money from Creative Sparks again. Their low price good-quality software range now includes a game which might be interpreted as a searing indictment of the effect of government cuts on hospitals. So bad are things at St Crippens that you would rather escape from the hospital than risk treatment. Pursued by nurses, matrons, porters and even creatures from the genetic engineering lab, you must find your clothes so you can slip past the security guards.

Contact with the staff and patients gradually debilitates you to the point where you end up on crutches. Then you die. Simple but well-executed graphics, and dashed tricky to play using the cursor keys.

(continued from page 27)

bodies, hanged men and so on, but sooner or later you will have to knock someone off, take them back to the schloss and dismember them. You can't use too many parts from the same dead body or the resultant thing will be uncontrollable. Best not to knock someone off in a crowded pub because the villagers will attack.

You steer your character around the screen using the joystick, and if you are in a position to attack a villager, the relevant command will appear and if you think it is wise you can start in on a little mayhem. Then you will find it easy to get the command "carry body" and thence back to the castle for a little home surgery. Best to use the underground passage way — there's one from the castle to the pub, for example, otherwise the villagers will cease to be placid.

Once you've got your cadaver together and energised it, you present it to the people at the village hall. If you're lucky, the villagers will rave about the thing from the grave and hail you as genius. If they don't dig it, they'll bury you. The game has a potentially monstrous appeal and will be enjoyed by transplant surgeons everywhere.

Paul Bond

Mad Prof: a little home surgery.



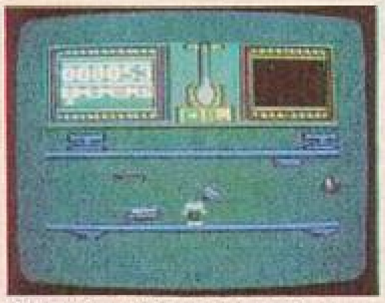
Thing On A Spring

- *CBM-64*
- *Gremlin Graphics*
- *Arcade adventure*
- *£7.95*

★★★

A REALLY PROMISING program from Gremlin Graphics, showing that with or without Tony Crowther they are capable of still coming up with the goods — maybe not great innovation but still a game that is pleasant to look at and absorbing to play.

Since the Evil Goblin is lousing things up as per usual, our hero — Thing On A Spring — has hopped into the enemy's underground factory to save the world. An appealing little fellow, he has to bounce on and off various platforms and conveyor belts to achieve his goal. But this is no simple platform game-cum-shoot-'em-up.



Thing On A Spring: catchy tune, now catch the goblin.

In order to use certain parts of the screen, you must first acquire the five control boxes. These take the form of little parcels lying about in fairly inaccessible places.

Apart from this, there are nine pieces of jigsaw to collect. When assembled, these provide the vital clue to the extinction of the afore-said Evil Goblin.

There are four floors to work through and by the end of the game you should know how to trap the Evil Goblin. Either way the catchy musical soundtrack will be firmly embedded in your brain.

Paul Bond

SOFTWARE Shortlist



Profanation — the diamond will show you the way.

Profanation

- *Spectrum*
- *Gremlin Graphics*
- *Arcade adventure*
- *£7.95*

★★★

PROFANATION IS certainly the name of the game here, since the idea of easing you into the game gently is not the idea. So you will be tempted to use all sorts of naughty words as you signally fail to get your little purple blob to jump past the acid drip on the first screen.

Reminiscent graphically of Bugaboo and Fred, both products of those immortal Spaniards Paco and Paco, and with names like Victor Ruiz, Florentine Petrejo, Santiago, Morga B and Snatcho on the credits list, we leave you to draw your own conclusions, i.e. they have nothing to do with Paco e Paco except being Spanish. You have to discover the secret of Abu Simbel, the ancient Egyptian temple and free Johnny Jones from the spell.

Since this is just about the most fiendishly difficult platform-style game that you are ever going to meet, or want to meet, you will be doing an awful lot of tooth-gritting. You have to learn that you don't need to stand vertically on top of objects. Wait, calculate and think before you act, hints the program at the beginning — it also hints that "The diamond will show you the way".

This means that on one of the screens there is a diamond. You should note the colour of the gem as at another point in the game you will encounter a screen with five coloured squares on it. You must touch the square that is the same colour as the diamond if you want to progress further. Otherwise things get very profane indeed.

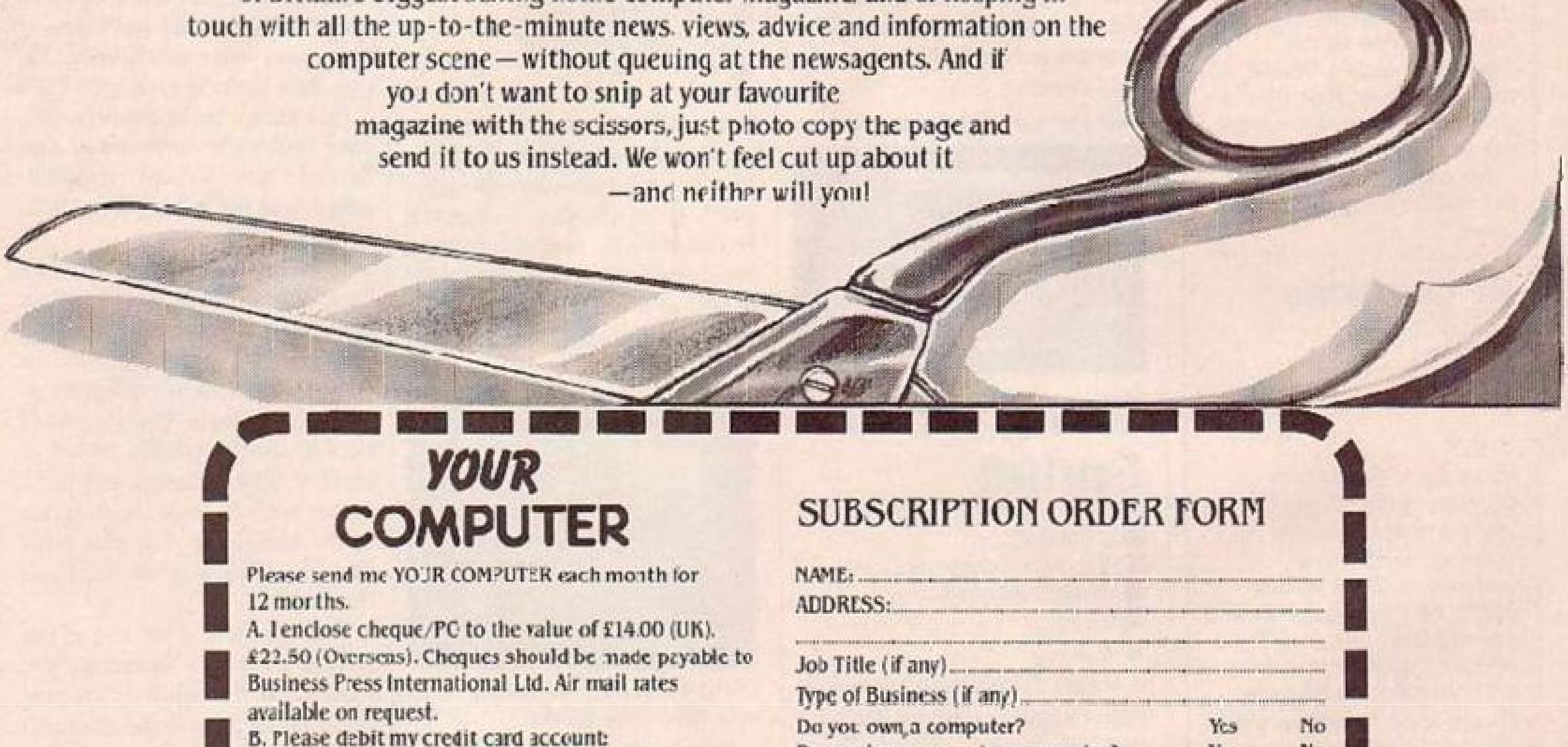
Graphics are pleasantly executed — as you yourself are from time to time — and the purple blob which is Johnny Jones has a whimsical way of looking around and grinning while waiting for the next move. Could be a distant relative of Roland Rat. All in all, one of the best tombs I've ever had to work in.

Paul Bond

(continued on page 31)

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YOUR COMPUTER

Star★ chart

Paws

Spectrum
Artic
Maze game
£7.95
★ ★ ★

Just when you thought it was safe to change the cat tray — Artic have come back into the games market. In this setting of feline ferocity, you as the top cat have to get all your kittens together before the local dogs attempt a final solution to the caterwauling problem. So you scour the maze looking for the little ones and battling with any dogs you encounter. You can despatch canines by spitting fur balls at them. Not as pretty as Caesar the Cat but might appeal to Spectrum owners whose cats sit on the machine because it is the warmest place in the house.

Glass

Spectrum
Quicksilva
Shoot-'em-up
£7.99
★ ★ ★

Stunning graphics, but a prolonged opening sequence of blasting away at different aliens zooming towards you might put some people off. There are, however, three cities to attain. Also the gigantic megaships which crawl across the screen periodically become more numerous as the game progresses. Usual witty comments about what your status in the galaxy should be — like "Commodore owner".

Aabatron

BBC
Bevan Technology
Shoot-em-up
£2.50
★ ★ ★

Good, safe familiar territory here. 20 screens, lots of action, colour and noise, indiscriminate destruction, touching just about anything kills you, variable speeds from boring to suicidal. Good, clean, harmless fun. Mildly addictive and good value.

(continued from page 29)

SOFTWARE *Shortlist*

Highway Encounter

- *Spectrum*
- *Vortex Software*
- *3D shoot 'em-up*
- *£7.95*

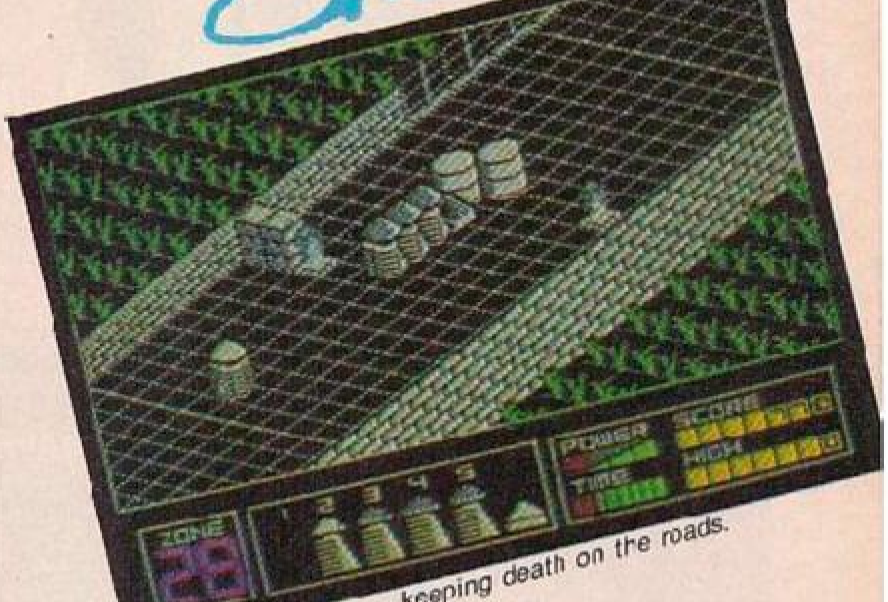
★ ★ ★ ★

ZONE ZERO IS your goal. You have to take five Vortons there. And they in turn are trundling the world's most advanced weapons system, the pyramid shaped Lasertron in front of them. You have to get past marauding aliens, floating mines and abandoned oil-drums to destroy the invader stronghold.

The screen gives a Zaxxonesque three-quarter overhead view of a futuristic highway leading through the hydroponic fields, oxygen forests and fish-farms of the future. You start in zone 30 with a main Vorton and four auto-Vortons, plus of course your Lasertron. Your job is to troop along like a convoy of lorries carrying nuclear waste through the city at dead of night.

With the joystick or keyboard you control the main Vorton who is basically in the role of Sunday school teacher shepherding rather manic Dalek schoolchildren on a nature walk. They will charge along with their deadly toy until they run into something.

The best plan seems to be to stall the gang behind some oil drums



Highway encounter — keeping death on the roads.

then nip through the zones and take out the various hornswogglers, squigglies, mouffs and hostile ice-hockey pucks that assail you. Most of these creatures defy description, but are well-designed down to a gleaming reflection on the road.

There is plenty of opportunity for doing strategic things like moving oil drums around to box up the floating energy mines so that they don't hurt your crocodile of chumblies once they start charging down the highway.

At the base of the screen the display tells you which zone you are in, how many Vortons are left, and displays power, score, time left and high score.

A game for control freaks and Dalek and droid lovers everywhere.

Paul Bond

Rupert and the Toy-maker's Party

- *CBM-64 and Spectrum*
- *Quicksilva*
- *Arcade adventure*
- *£7.99*

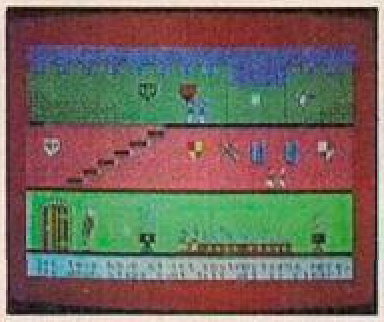
★ ★ ★

RUPERT'S CHUMS are holding a wild party — oodles of currant buns and lashings of pop. But getting the ancient teddy bear there on time is going to be no picnic.

You have to manoeuvre the geriatric Rupert through seven screens of great graphics to what are presumably his sixty-fifth birthday celebrations. Rupert's first computer escapade is played out in and around the toymaker's castle.

The toymaker himself never puts in an appearance but there are plenty of his products about — most of the toys are out of control and aiming to make a nasty mess of the cuddly bear. But animal lovers shouldn't worry; no nasty incidents of mammal mangled in clockwork. The worst that happens is that Rupert takes a tumble and after six of those the game ends.

Toymaker's Party is a platform



Rupert gate-crashes a wild party.

game with the action viewed from the side. You have to get Rupert to collect the party invitations pinned to the walls to progress to the booze and buns.

He hops and jumps energetically over an assortment of runaway jack-in-the-boxes, toy soldiers and trains, and can hitch a lift to safety on the back of magpies and toy aeroplanes. Be careful in the later stages — toys that were benign become killers and what were dangerous gadgets suddenly become Rupert's allies.

The setting for this game may be out of the nursery, but it's good clean fun to play and the graphics and music are as good as any you'll find in a CBM-64 platform adventure.

Toby Wolpe

The Scout Steps Out

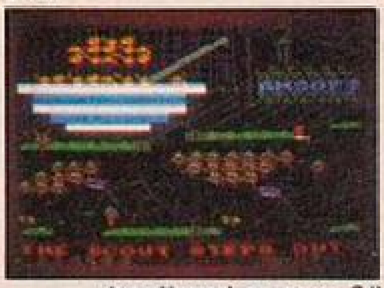
- *Amstrad*
- *Amsoft*
- *Platform*
- *£8.95*

★ ★ ★

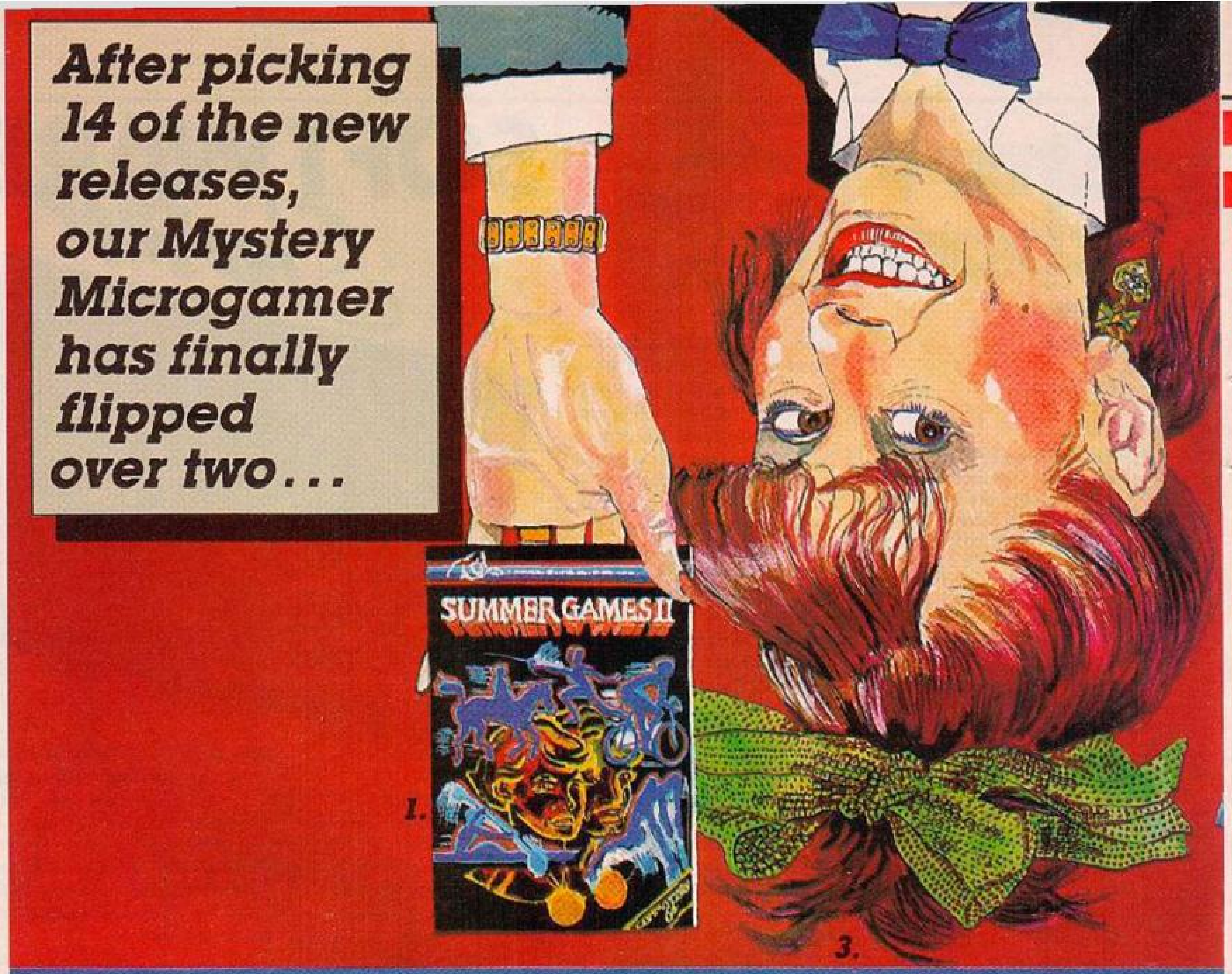
TO CALL THE Scout Steps Out a platform game may be a trifle unfair. Only a few of the game's 13 screens contain platforms and there is not a conveyor belt or crumbling ledge in sight. Instead you may have to swim underwater, pick your way through a forest in search of mushrooms, or dodge the keepers in a park. Other exotic locations include an animated circuit diagram and a rain-swept block of flats.

You start off at base camp where

Be prepared — Scout Steps Out.



(continued on page 34)



'Three of a kind, O.

My really brill two:

1. Summer Games II *from US Gold. I'm a value freak and a closet athlete and now I can play in my silver lurex tracksuit!*

2. Sparklers Special *from Sparklers – 'cause this way I get four absolutely triff games for the price of one!*

3. Just Mystery Me!

My pick of Arcade and Adventure

GLADIATOR

by Microgen

This is Roman arena 'Hail Caesar stuff'. Slay or be slain in 15 very gory contests. Plus gambling for your life. Even worse than a series with Lenry Henry. Well, almost.

Spectrum 48K £7.95

DYNAMITE DAN

by Mirrorsoft

I warn you your mind and everything else – is going to be *blown!* I mean boom, boom. Believe me, these are horribly impossible puzzles, only *so* good. And really special graphics that keep you jumping all the way through.

Spectrum 48K £6.95
Amstrad £7.95

Quake MINUS 1

by Monolith

You look like a recruit for the Robot Liberation Front – they only take weirdos like us! All we have to do is demolish the undersea Titan power plant and sort of bust up the world with quakes and tidal waves. OK ya?

Commodore 64 £9.95

TERRORMOLINOS

by Melbourne House

This is the Costa Blanca gone stark staring bonkers. To survive the disasters of this utterly ugh family holiday you have to enter a saucy postcard world. To escape, you have to look snappy – literally – by bringing back 10 photos that prove you were there!

Versions for most machines £7.95

THORN EMI Computer Software

International Micro Software Division



K ya?'

JUGGERNAUT by CRL

From the micro-makers of the Rocky Horror Show comes this 'rocky road show'. You drive a giant articulated lorry through roads and blockages you won't believe.

Spectrum 48K £7.95

SPARKLERS SPECIAL

by Sparklers

How did they cram so much in? Like *Slurpy* the greedy-guts who guzzles Glowbugs and other similar yuk. Like *Orc Attack* with you defending your castle against plebs. Like *Black Hawk* the ultimate combat plane with 30 levels of play. And like *River Rescue* with you in the speedboat trying to save scientists, as if you'd bother!

Commodore 64 4 games £7.50
Spectrum 48K

Something for you armchair athletes

TOUR DE FRANCE

by Activision

After 16 grueling Stages round scenic France, you may never face a saddle or a yellow jersey again. If you're certain your joystick skills are 'formidable' – get pedaling!

Commodore 64 £9.99

INTERNATIONAL BASKETBALL

by Elite

Are you ready to jump, block and steal? Twist in mid-air? Go for basket after basket against 3 opponents through 9 skill levels from the utterly pathetic to Harlem Globetrotter? You *are?*

Spectrum and Amstrad £5.99

SPOT THE BALL

by Creative Sparks

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Atari 32K £8.95

SUMMER GAMES II

by US Gold

Stage your own Olympics! With 1-8 players and eight events, practice sessions *before* the real thing, then Ceremonies, National Anthems – the lot! You'll be as flakers as me after cycling, fencing, kyaking, high and triple-jumping, rowing, javelin and riding. Really, really good.

Commodore 64 £9.95

It's 'bats-out-of-hell' time!

RED ARROWS by Database

They call this flight simulation – *stimulation* more like! You get 3D on the graphics and 6G on the aerobatics. RAF pilots helped write this program. For most micros.

Cassette £8.95
Disk versions £11.95 and £12.95

ARNHEM

by CCS

This is actually more risky than a Harrods Sale – really. Just like 1944 in the second world war, you're in a tactical wargame, parachuting behind enemy lines to snaffle vital bridges and let the Allied Forces through. 1 or 2 can play.

Spectrum 48K + £8.95
Amstrad version £9.95

Super plays for rainy days!

SOUTHERN BELLE

by Hewson Consultants

Bet you can't get your steam train through 24 stations with enough water and coal left to get you to Brighton on time. What with signals, tunnels and other snags, by the time you arrive you'll be steaming!

Spectrum ZX 48K £7.95

Trivia by Anirog

This is a quiz! The computer rolls the dice and asks the questions in 6 categories – one or two of which even bone-heads can answer. Nearly 2000 questions and most of them really silly.

Versions for most machines £9.95

Win

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Send to: Thorn EMI Computer Software, Mystery Microgamer Competition, Thomson House, 296 Farnborough Road, Farnborough, Hants. GU1 7NU.

Last month's Mystery Microgamer was Kenny Everett

10 prizes are on the way

Stephen Martin, London
Ian Williams, Caernarfon
J R Barnsley, Stafford
Nick Withey, Swindon
Jonathan Maycock, Newcastle upon Tyne
D Kirby, Greenford
Geoff Bedford, Mellor
Christian Mead, High Wycombe
Lee C Gomm, Berkhamsted
Patrick Oliver, Birmingham



All games featured above are available from Laskys, WH Smith and other good software stores

Star★chart

Desert Burner

Spectrum
Creative Sparks
Shoot-em-up
£2.50

★ ★ ★

Another implementation of the ever-popular moon-buggy genre. You have to leap over various obstacles whilst keeping an eye on the various things flying around chucking things at you. However, this version combines this with speed control which varies the length of the jump. This makes the process of jumping over things a great deal more fraught. Too fast and you won't come down in time for the next jump, too slow and you won't get over. All in all a good little pot-boiler.

Metabolis

Spectrum
Gremlin Graphics
Arcade adventure
£6.95

★ ★ ★

You are a bird. The Kremins metamorphosed you, so you have to find the serum room to get back to human form. There is a wizard who cures you of all ills. You need a licence to kill as well. Interesting and quite humorous graphics.

Nick Faldo Plays The Open

Spectrum
Argus
£9.99

★ ★ ★

Icons are all the rage these days and are well to the fore in what is probably one of the best golf simulations around.

The icons at the base of the screen allow you to choose clubs and control, force and direction of shot. You have a caddy who doesn't tell you what to do, but says things like "OK" in a little speech bubble if you're making sensible decisions. Not a golfer myself, but the accompanying booklet is informative and should appeal to learners of the ancient game.

(continued from page 31)

your troop of scouts is bivouacked. The game tells you that your mission is to be a good moral example to your troup. Translated into playing action this means finding the route that will take you to the next screen and picking up objects along the way. As each screen is crowded with a different set of life-forms, all of them hostile, this is no easy task. But if you can get back to screen one there is a large bowl of cornflakes which will restore any lives lost.

The authors, Dave Rogers and Colin Hogg, are regular *Your Computer* contributors; and if you have ever keyed in one of their programs, you will know that their games have a highly original flavour. What makes this one special is its graphics. Almost every screen has some pleasingly inventive touches, while the wet scenes in particular are a maritime marvel: rolling waves, rotting octopuses, and some superbly convincing sound effects.

Simon Beesley

Dynamite Dan

- *Spectrum*
- *Mirrorsoft*
- *Platform game*
- *£6.95*

★ ★ ★

THERE IS certainly plenty here on the menu: eggs, cocktails, fruit, cheese, cake, ice cream, tea, soup — certainly the greatest variety of cuisine ever encountered by anyone trying to stay alive in an arcade adventure game.

Plenty of interesting things to pick up as well — credit card, deodorant, test tube, oxygen, dynamite — of course — and the top secret plans.

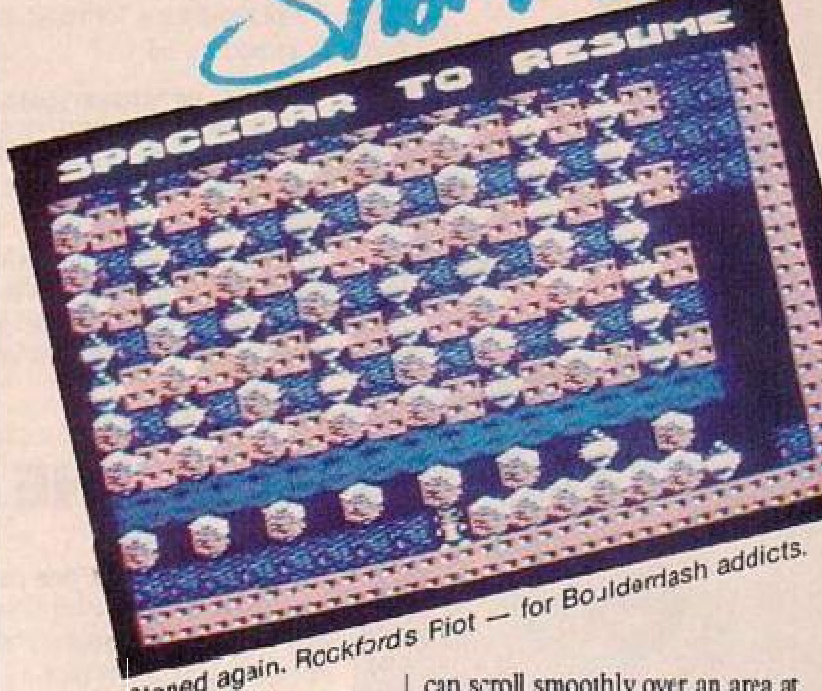
As Dynamite Dan you must thwart the plans of Donna and Blitzen (gedditt?) as they try to take over the world. The top secret plans are for a super psychon mega-ray; Dynamite Dan must garner eight sticks of dynamite so he can bust into the safe where the plans are kept. As you guide the prospective peterman in his odyssey, plenty of ugly insects, acrobatic hydrae and other nasties assail him.

You should also beware of attacks of negative buoyancy — Dan can't swim — warning beeps indicate imminent starvation.

An interesting permutation on the theme is the use of trampolines at strategic points in the game — you can bounce around to your heart's content.

Paul Bond

SOFTWARE *Shortlist*



Stoned again. Rockford's Riot — for Boulderdash addicts.

Rockford's Riot

- *CBM 64/Spectrum*
- *Monolith*
- *Excavation game*
- *£9.95*

★ ★ ★ ★ ★

INSTANT RELAPSE. Just when you thought you had licked your addiction to Boulderdash — easily the most potent game of 1984 — someone offers you a go at its sequel, Rockford's Riot. Pretty soon you dislodge a boulder, triggering off an avalanche. It gives you your first rush and the craving for more returns. To make matters worse, Monolith has included a copy of Boulderdash on the other side of the tape.

Rockford's Riot uses the same ingredients — boulders, jewels, amoebas, butterflies, fireflies, enchanted walls — but presents a brand new set of problems. There are 16 levels or caves as the cassette inlay calls them. In each cave you can scroll smoothly over an area at least six times the screen size. And in each you have to collect a given number of jewels within a time limit. But beyond this common factor there is enormous variety so that each level could almost be described as a separate game.

Take cave B for example. Amoebas are oozing out from the tops of three large vats. So you must first shift boulders to seal them in. If you succeed the amoebas turn into jewels. Then you have to dash down to the bottom of the vats, unplug them, and when the avalanche of boulders has settled, collect 75 jewels before time runs out.

Collecting jewels is a problem in itself. They are invariably embedded in a pile of boulders. As the game simulates perfectly the physics of rock falls, you only have to extract one for the whole lot to come tumbling down. When it is accompanied — as it is on the CBM-64 — by a distant booming this provides one of the most satisfying experiences in computer gaming.

Simon Beesley ■

Save the world with Dynamite Dan: Mirrorsoft's explosive action.

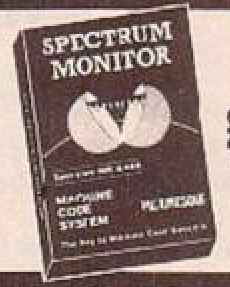


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ADD-ON EXTRA

Amstrad SSA-1

Speech Synthesiser
Amstrad
£29.95

Hot on the heels of the DK Tronics unit reviewed in June, this is the "official" version. As it uses the same chip, and most of the commands do similar things, there isn't a great deal to choose between the two.

However, this version makes "legal" calls and so is compatible with all past and any future add-ons.

Hyper Shot

Game Controller
Various
£9.95

Joystick just so much twisted plastic? Still after that elusive four-minute mile? Well, for sports enthusiasts everywhere, Konami has brought out a box with three hopefully very robust buttons which simulate left, right and fire joystick movements. Plugs into any Atari-style joystick port. Available direct from Konami on 01-429 2440.

Discovery 1

Disc System
Spectrum
£199.95

Granted the Spectrum owner's reluctance to buy a peripheral that costs more than the original system, does the Discovery add up? For your money you get a disc drive, a printer port, a joystick port, a built-in power supply and a monitor output.

The disc system is excellent. The single-sided drive gives you 180K formatted capacity. It is compatible with all Microdrive commands, but also has a full complement of "proper" disc commands. These include random access files as well as a Ram disc system where an area of memory is set aside and acts like a fast disc.

Blank 3½in. discs are widely available, and are rugged and reliable. A fast disc drive with a powerful operating system. But will it tempt the budget-minded Spectrum owners? Available from Boots.

HARDWARE hitlist

Databeeb

- *BBC*
- *Miracle Technology*
- *£25*

IF YOU FANCY breaking into the world of micro communications, you'll need three things: a computer, a modem, and, perhaps most importantly, the software. Along with the usual Prestel and Bulletin Board software, Databeeb has facilities for controlling the company's Minor Miracles modem, in much the same way as the ZROM works for the Demon.

However, there are major differences. Databeeb uses the User port to control the modem, leaving the RS-423 port free for data handling. It also has BABT approval! The modem can be upgraded to get the most out of the new Rom. Auto answer, auto dial and mode selection upgrades are available. The whole lot, modem with all the extras and Databeeb, comes to around £200. But this is a piece of kit designed up to specificatioin rather than down to cost.

If you are looking at Databeeb as a Comms Rom for any modem, it compares well with Pace's Commstar, its main rival. In Prestel mode, the last 16 pages are stored in Ram and the user can select eight others. These can be redisplayed and then treated as though they were the current frame for routeing purposes.



The Databeeb — software on a Comms Rom for any modem.

Unfortunately, no off-line message editor is provided, and a printer dump is available for text only. The operating system can be accessed at any time by pressing the copy key. The bulletin board type software has the usual facilities to direct output to printer and/or disc.

40 and 80 column modes are available, and the various commands are displayed optionally at the bottom of the screen. File transfer uses the X-modem format of Commstar. The software supports X-on X-off protocols, local echo, line feeds and a variety of data formats are provided.

All the modem's functions are available through "star" commands, which means writing simple bulletin boards, doing unattended downloading, or even a little hacking should not tax anyone's basic programming skills.

If you've got a Miracle modem, and are thinking about upgrades then this is a good starting point. For anyone else, there is little to chose between this and Commstar. It's really a matter of personal taste.

Lee Paddon

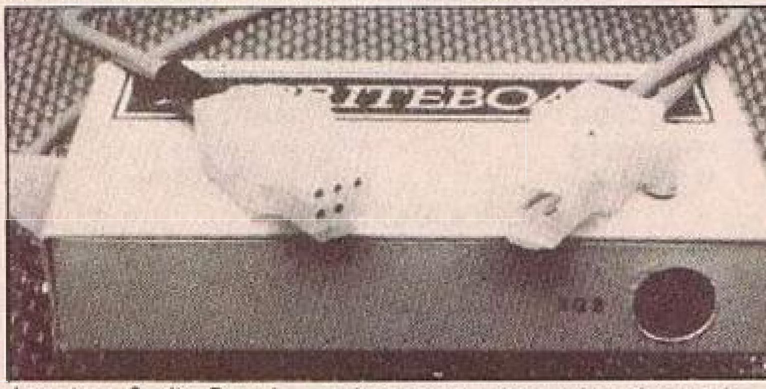
Logotron Sprite Board

- *BBC Micro*
- *Logotron Sprite Board*
- *£179.95 — or £239.95 bundled with Logotron Logo. There is a discount for schools*

THERE'S MORE to Logo, say Logo enthusiasts, than turtles. And indeed there's more to turtles than plotting those familiar geometrical patterns. With Logotron's sprite board, you can even write a game.

The board comes in a small metal box which links via a ribbon to the BBC's 1MHz bus and by a second cable to the power connector.

You activate it by selecting Logo and loading a long — &4300 bytes — file, whereupon you're prompted to switch to the sprite screen. This you do by plugging your monitor into the sprite board, which now directly provides the video for your screen — there's a choice, RGB, composite PAL or plain ordinary uhf TV signal.



Logotron Sprite Board — write games without learning code.

The result of this is a sort of super-Mode 2 screen with 16 colours, including dark and light shades. At your disposal now are 32 sprites masquerading as turtles, each of them capable of assuming any of 64 shapes. There's a selection ready-made: a lorry, a tulip, a dog, a cross and so on; and of course a profusion of turtles, both realistic and symbolic. To define your own shapes, you can call up an excellent built-in editor.

And to animate them you can draw on nearly 50 new Logo commands. You can whizz turtles around the screen, manipulate them independently or together, detect collisions and fill this or that with colour. So in theory you could write your own Frak! without having to learn machine code.

All great fun, and educationally very sound if rather expensive. But the software wouldn't run with my non-Acorn disc interface. And the computers I tried wouldn't always power-up correctly with the board connected. Check before you buy.

Richard Lambley ■

NEWS
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The crystal ball

Melbourne House has now brought out a new and vastly improved version of The Hobbit on disc for BBC B owners. As well has having an increased number of locations, the game features graphics for the first time for Beeb owners — over 50 different screens of them.

The BBC B disc version costs £17.95. A superb disc version is already available at the same price for the CBM 64. Tape versions cost £14.95 and include BBC B, Commodore 64, Spectrum, Oric/Atmos, MSX and Amstrad micros. Only one thing to say — when can we expect an Atari version?

Great news for Infocom addicts — a new adventure called Wishbringer has just been released.

A helping hand

Fulvao Cerlesa, an Italian devotee of English adventures, has called again, this time to request help with Adventure International's Gremlins (his phone bill must be colossal!):

Cannot kill all the gremlins?
METS YSTN EVEH TNIM EHTP ART

Want some more assistance?
SNIL MERG PUWO LBNE HTST NEVR EVOS ETAL PLAT EMCL EW

Don't know the essential kit?
EPIP SAGD NA(P UTUC) XOB LIAM

Some players are puzzled in Acornsoft's Philosopher's Quest:
Portcullis won't open?
TELU MAYB UREH TBUR

Can't get out of the whale?
HTOO TEHT GNIT TEGE FOFE BDOO WTFI RDTH GIL

Yours against ghosts and gremlins,
Hugo North.

QUEST Corner

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.



Not the hunt for the end of the Northern Line, but Melbourne House's latest adventure — Mordon's Quest.

Mordon's Quest

- *Spectrum/CBM-64/Amstrad*
- *Melbourne House*
- *£6.95*

FROM JOHN JONES-STEELE, the author of Melbourne House's popular Classic Adventure, comes this superb new text adventure. It has over 150 locations, a vocabulary of more than 400 words and uses clever text-compression techniques.

You begin in the master bedroom of a house, having just fallen out of a four-poster bed. Mordon, one of the seven Lords of Realities, soon appears to tell you that a power-crazed Lord has broken up a life-controlling machine and dispersed its seven component parts through time and space. Your task is to seek out the pieces and return them to the house.

Armed with a blanket, torch and transporter unit, you're soon in a jungle where the quest begins in earnest. Quicksand, a carnivorous plant which can't be killed — it's a protected species! — and a pygmy's hut — complete with AA, plate and knife symbols — are the first of many challenging problems.

With its detailed atmospheric text and touches of humour, Mordon's Quest guarantees many hours of stimulating pleasure.

Beatle Quest

- *CBM-64*
- *Number 9 Software*
- *£9.95*

PREPARE YOURSELF for a trip back to the Swinging Sixties — the Fab Four have just made their first-ever authorised appearance in an adventure.

Beatle Quest is a Quilled text adventure which revolves around a wide selection of lyrics from the Beatles' songs. Much of the fun comes from spotting them. The game contains over 150 locations, 60 objects and 200 messages. You must amass 1,000 points by solving puzzles, collecting items and completing certain actions.

The quest begins in a bedsitter where a strange but beautiful girl is asleep on the divan bed. Tempting as it might be, trying to awake her with a kiss results in a deadly embrace and it's goodbye, goodbye, goodbye.

Out in the street, those shops that are not closed for the half-day merit further exploration. You'll need to find a certain object fairly quickly because your body soon starts to tremble and vibrate. Unless you obtain this vital nutrient, you'll end up as dead as surely as if you had been walloped with Maxwell's silver hammer.

The text abounds with reference to the songs. For example, in a lonely side street you can't help wondering where all the lonely people come from, where do they all belong. A dental surgery is owned by a Dr Robert. Down at the railway station, a sign informs you that the "one after 909 has been cancelled".

Asking for help is answered with "you'll get by with a little help from your friends" while attempting to do something impossible is met by "Oh . . . you can't do that".

If most or all of these allusions mean nothing to you, then you won't get much out of the game unless you brush up on the Beatles' songs first. For those still steeped in Beatlemania, the quest offers a tough but nostalgically enjoyable experience. ■



Magical mystery tour — Number 9's Beatle Quest.

CP/M — PLUS OR MINUS?

One of the earliest microcomputer disc operating systems, CP/M runs on hundreds of different makes of computer. Z-80 versions are known as CP/M-80, in contrast to CP/M-86 or CP/M-68 which run on 16-bit processors.

Originally written — by Digital Research's Gary Kildall — to fit on micros with only a limited amount of Ram, it has remained a relatively unfriendly system to work with. Some CP/M commands are cumbersome to use; while, far from being friendly, its error messages are often downright hostile.

But the crucial point about CP/M is that it can be implemented on almost any Z-80 micro and its software is portable. Programs written for one CP/M machine will run on any CP/M machine.

There is a vast range of application software running under CP/M. Because the system has been around for so long and on so many machines there are literally thousands of programs available to the CP/M user.

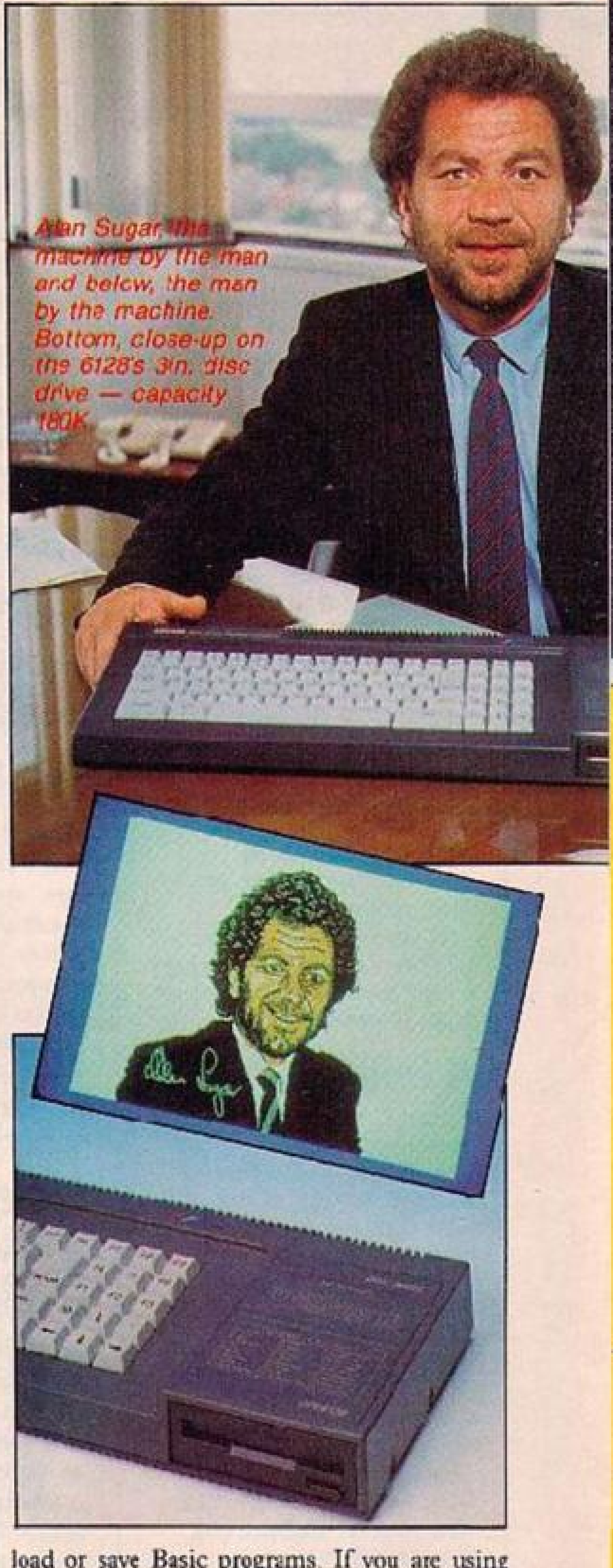
Two qualifications need to be added here. First business software is not cheap. Home computer owners who are used to paying, at the most, £50 for a word processor on Rom will be staggered to find that some of the best-selling CP/M programs can cost several hundred pounds. Second buying a CP/M program involves more than just choosing the right package. You need to find a distributor who can supply software on 3in. discs and in the Amstrad's disc format. You will also have to customise CP/M software to work with the 6128's screen and keyboard configuration.

However, as it turns out, neither of these problems looms large. Anyone seriously committed to using a micro to help run a small business should be prepared to spend as much on software as the hardware itself. And apart from CP/M classics like Wordstar, dBase II, and Supercalc, there is a considerable amount of software that comes a lot cheaper.

Customising a program to work with a particular computer is mainly a matter of telling it what the machine's screen parameters and control codes are. Amstrad has made the task easy by setting the 6128 up to emulate a VT-52 terminal. Most CP/M software comes with an installation program which includes an option for this widely-used type of terminal. On top of this there is already a number of distributors — Timatic Systems and Honeysoft in particular — who supply CP/M programs tailored for the Amstrad on 3in. discs.

Business applications apart, one of CP/M's other attractions is that it supports compilers for almost every known computer language. You can even run the Z-80 version of BBC Basic on it. Quite a few languages are also in the CP/M User Group's large Software Library. Its contents include assemblers, word processors, text adventures, communications software, music files, and hundreds of miscellaneous disc utilities. Most importantly, it is in the public domain. In other words, except for a small copying charge, it is all free.

AMS



Alan Sugar, the machine by the man and below, the man by the machine. Bottom, close-up on the 6128's 3in. disc drive — capacity 180K.

THE AMSTRAD 464 was launched in June last year at about the same time as the bug-freer QLs began to hit the streets. 15 months later only 50,000 QLs have been sold while the Amstrad has established itself as one of the three best-selling home computers in Britain. How is it that in a year when almost every other micro manufacturer folded or floundered, Amstrad has flourished?

Undoubtedly one reason is that the 464 comes with a monitor and built-in cassette recorder at an unprecedentedly low price. But equally important is the fact that, although its design is not especially advanced, it scores highly in almost every department — graphics, sound, Basic, construction, and I/O connections.

This computer is largely free of the quirks and omissions that flaw most other micros: a tacky keyboard on the Spectrum, antiquated Basic on the CBM-64, bugs on the QL and Oric, the memory-starved BBC, and so on.

Amstrad followed the 464 with the 664, which has a built-in 3in. disc drive in place of the cassette recorder. It has a few extra Basic commands such as the graphics command Fill, and sacrifices 1,280 bytes Ram to the disc operating system. But its major difference is the ability to run CP/M 2.2, which is supplied partly on disc and partly on Rom. The idea behind providing CP/M is to widen the machine's scope for attracting business users.

Just a few months after the launch of the 664, the company has now produced another computer with a built-in disc drive, the 6128. This comes with a total 128K Ram and runs an enhanced version of CP/M 2.2, CP/M Plus. It is still software compatible with the earlier models.

Although the 6128 offers more than the 664 — which will be quietly dropped from production — it costs less: £299 with a monochrome monitor, £399 with a colour monitor. If you are not fussy about picture quality you can buy a £30 modulator and use the monochrome unit with a colour TV.

Originally Amstrad announced that the 6128 was solely for the American market. It is not hard to guess why the company has delayed the announcement of the machine's U.K. launch until the last minute. But it is tough if you have just spent £449 on a 664.

In appearance the 6128 is more or less the same as the 664. Amstrad has sensibly repositioned the cursor keys at the front of the keyboard and the overall height has been reduced. At the back there is the same array of ports as on the earlier model — a Centronics-style printer interface, an expansion port, and a socket for a second disc drive. Also unchanged at the side are the cassette and joystick ports together with a stereo jack for sound output.

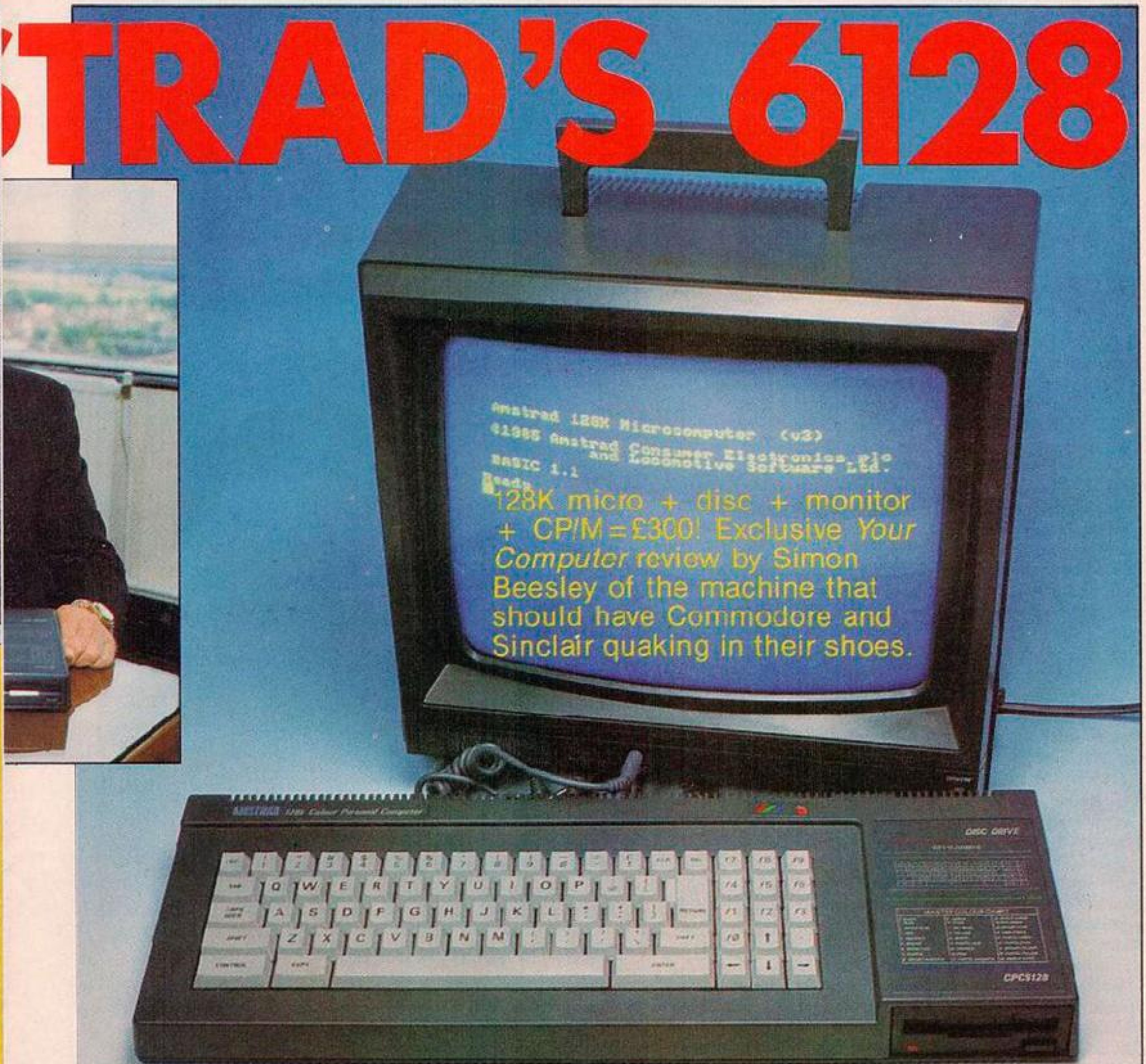
Apart from the addition of CP/M Plus and another 64K Ram the machine's specification is the same as the 664's. Based around a Z-80A processor running at 4MHz, it carries 128K Ram and 48K Rom. The Basic interpreter and the operating system are held in 32K of the Rom, while the remaining 16K contains Amsdos and a small part of CP/M. Amsdos is Amstrad's own disc operating system which serves as an alternative to CP/M.

The two systems coexist peacefully, reflecting the 6128's dual nature both as a small business machine and a home computer. Basic is switched out when CP/M is running so you cannot then load or save Basic programs. If you are using Amsdos you need to run CP/M to format discs, back up and copy files; otherwise you can ignore it.

When Amsdos was first introduced Amstrad described it as a fast cassette system. You might expect a disc operating system to be rather more than this. And, indeed, as disc operating systems go Amsdos is fairly rudimentary. There is no facility for creating random-access files and only a limited spread of disc commands. Still, what it does offer is probably quite adequate for the average user's purposes.

Some people have berated Amstrad for choosing 3in. disc drives rather than the more common 3.5in. drives. But the 3in. discs have

STRAD'S 6128



128K micro + disc + monitor + CP/M = £300! Exclusive *Your Computer* review by Simon Beesley of the machine that should have Commodore and Sinclair quaking in their shoes.

BATTERING RAM

a respectable capacity of 180K on each side, and you can always add a 3.5in. or 5.25in. as a second drive.

Two discs are supplied with the machine. Along with CP/M Plus and its accompanying disc utilities, they hold a useful collection of programming utilities, a full 48K version of DR Logo, and GSX, a Graphics System Extension designed to let CP/M programs handle graphics. For good measure Amstrad has also thrown in the software that went with the 664 — CP/M 2.2 and a stripped-down version of DR Logo.

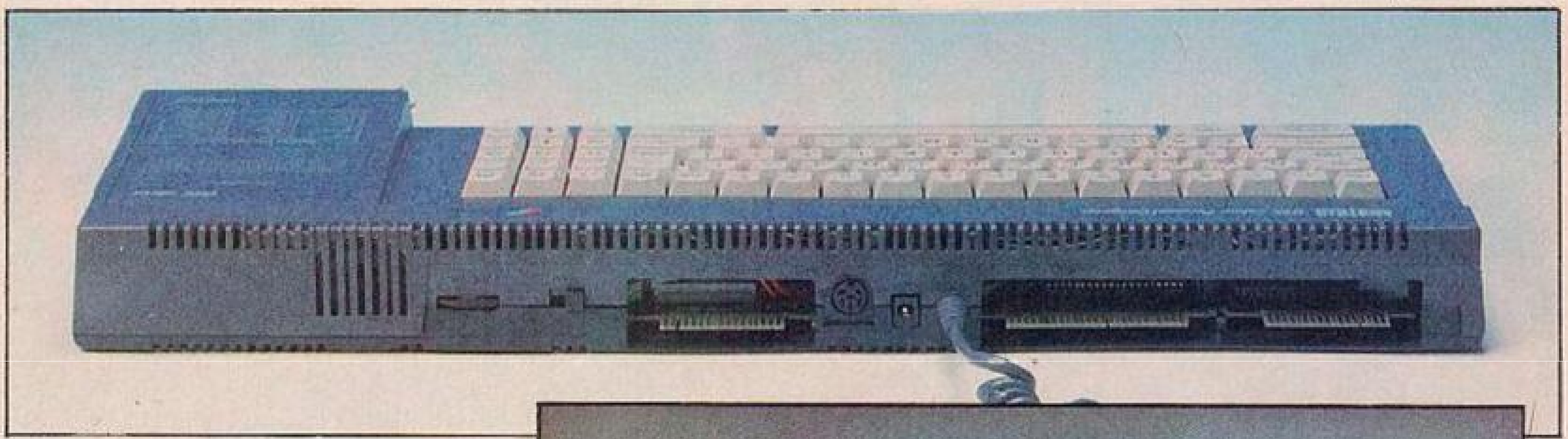
GSX is the 8-bit forerunner of Digital Research's GEM. Introduced a bit late in the day, so far it has had little success. With the notable exceptions of DR Graph and DR Draw not much software has been written for it. If someone were to add the 8-bit equivalent of GEM Desktop, GSX could give the Amstrad icons and windows in CP/M. But the result would probably be rather slow.

Another of the disc programs, Bank Manager, demonstrates some extra Basic commands which make use of the spare 64K Ram. As an 8-bit microprocessor the Z-80A can only address 64K of memory. So the 128K Ram is not organised as one block of contiguous memory, but as two banks of 64K, only one of which can be accessed at a time. You could not, for example, run a Basic program larger than 64K.

Two of the commands supplied by Bank Manager allow Basic programmers to store and display up to five screen images. The others use the second memory bank as a filing system. What these commands do not provide is a facility for storing programs, or variables as on the Commodore 128. No doubt machine-code programmers will find all sorts of interesting applications for the extra Ram; and, possibly, commercial games writers will be able to exploit it. But by and large it is not of much benefit if you are working in Basic.

In fact the main reason for giving the 6128 128K is to allow it to run CP/M Plus, which is designed to take advantage of bank-switched memory. One of the problems with running CP/M 2.2 on the 464 and 664 is that it leaves

(continued on next page)



(continued from previous page)

only 39K Ram for programs — not enough for most heavyweight CP/M packages like Wordstar.

By contrast CP/M Plus sits in one of the two banks of 64K Ram and loads programs into the other. In this way it makes 61K Ram available for programs, which is more than enough for any 8-bit CP/M program.

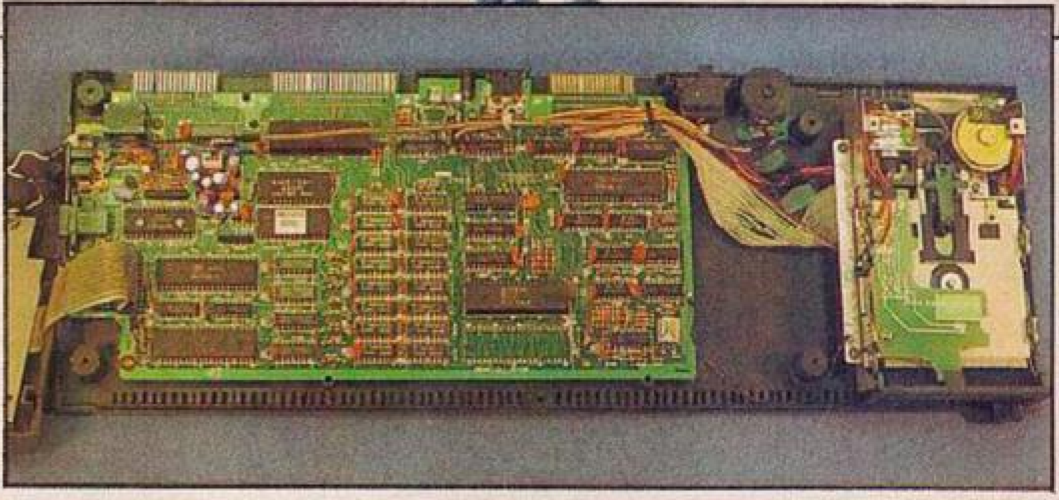
CP/M Plus takes up around 21K and represents a substantial improvement on the earlier 8K version. Not only is it faster in loading and saving to disc, but it is also easier to work with. Thus you can give it multiple commands on a line, recall previous commands, and edit lines. Along with a number of other enhanced features there is also a provision for switching to different national character sets — German or American, for example.

None of these features will interest people who use the 6128 as a home computer pure and simple — the sort of owner, say, who has moved up from a Spectrum. CP/M programs cannot, of course, take advantage of the Amstrad's graphics or sound. With the exception of text adventures, most CP/M games are of the sort that date back to the dawn of microcomputing — Tic-Tac-Toe, Ping Pong and the like.

So, leaving CP/M and the extra 64K aside, it is worth considering how the 6128 matches up against the opposition on the home computer front.

Amstrad Basic is almost as extensive as BBC Basic, and only a fraction slower. Among its special features are commands to harness interrupts from Basic — Every and After — and the facility for defining up to eight text windows, and one for graphics. As on the BBC, the operating system is unusually accessible via a large number of jump blocks — or vectors — in Ram. Extending Basic is easily done by defining Resident System Extensions — RSXs — to act as new commands.

There are three graphics modes which are well





World processing — top, how the 6128 interfaces with the outer world. The bare bones — middle, what the 6128 is like inside, and bottom, the fully-clothed machine.

supported by Basic graphics commands. At the lowest resolution, 160 by 200 in Mode 2, you have a choice of 15 colours from a pallette of 27. The highest resolution is 640 by 200 or 80 columns by 40 rows of text. Again, the machine's graphics are only equalled by the BBC Micro.

Sound is supplied through the internal speaker by the AY-3-8192 chip, as found in MSX machines and dozens of other micros. It is not quite as powerful as the CBM-64's chip but still gives three voices with full envelope definition.

Another plus is the facility for switching out the Basic Rom and adding alternative 16K Roms which plug into an external sideways Rom card. Once again this is also available on the BBC. Where the Amstrad scores over the BBC is in providing over twice the amount of user Ram. And it is also a lot cheaper.

Instead of sharing 64K between Rom and Ram, it switches Rom and Ram in and out of the same memory space. The screen memory and operating system work space take 21K of one of the two Ram banks, leaving the user 43K to play with.

The only serious rival to the 6128 at this price level is the new Commodore 128. Like the Amstrad the CBM-128 offers CP/M Plus and 128K Ram. It can also run CBM-64 software. Although there is already a large amount of games software for the Amstrad it does not begin to compare with the range of CBM-64 software.

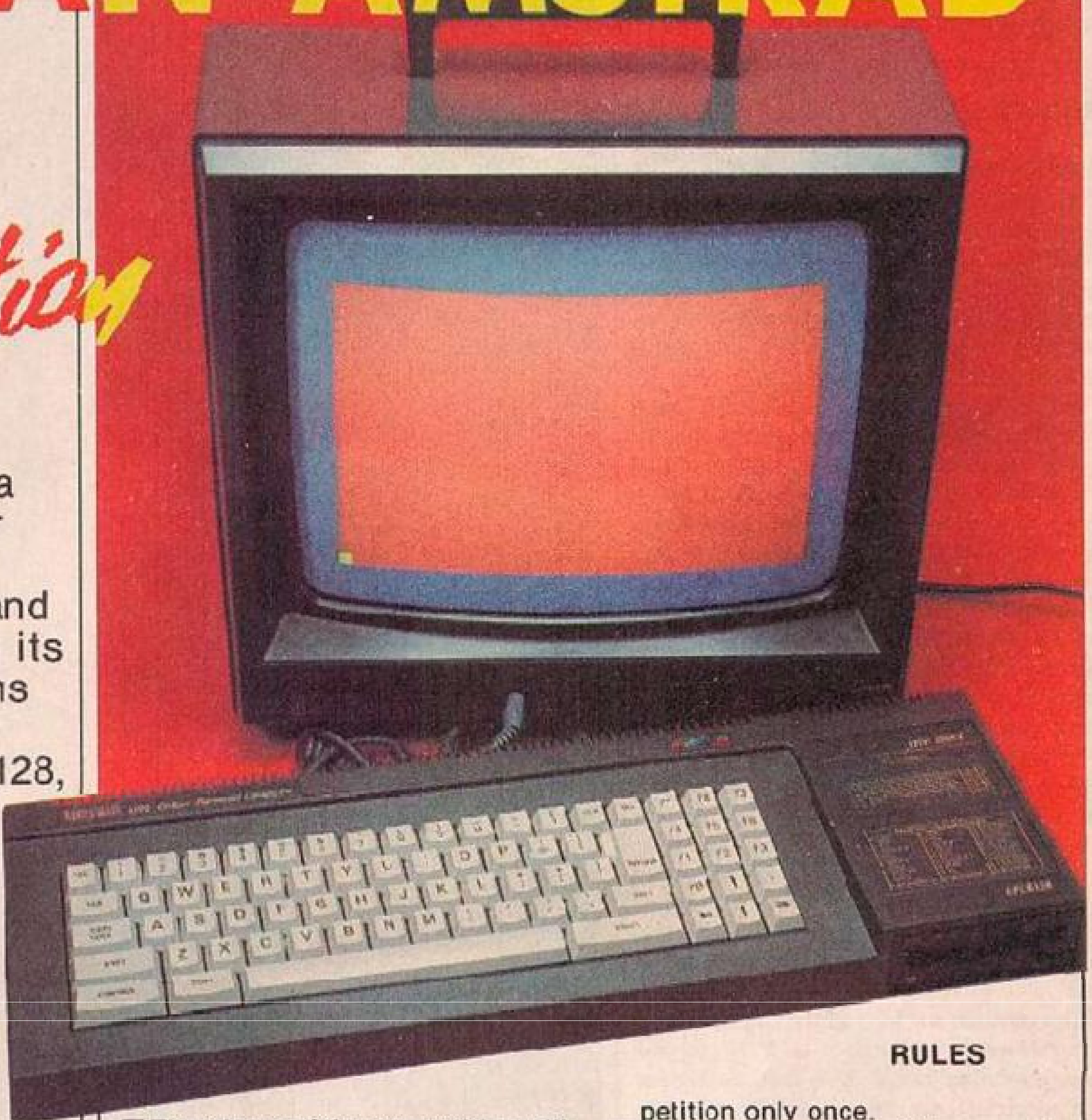
Set against this factor is the Amstrad's price advantage. The stock CBM-128 is expected to cost around £270. To kit it out with a monitor and disc drive will cost you twice as much. Both machines probably represent the final flowering of 8-bit micros, a species now reaching the end of its term. But in terms of value for money the 6128 is the best buy on the market. ■

CONCLUSIONS

- The Amstrad 6128 is exceptionally good value. Add the cost of a printer and you have a complete system for around £500, equally suitable for home computing and small-scale business purposes.
- CP/M Plus together with 128K Ram give the 6128 an important advantage over the 664: It can run the entire range of 8-bit CP/M software.
- CP/M and the extra Ram are of less interest to home computer users. But features like its excellent Basic and graphics are enough to make the 6128 superior to most other home computers on the market; and, to clinch the matter, it comes with a disc drive and monitor.
- There is already a substantial amount of games software for the Amstrad and its software support looks likely to improve as more companies include Amstrad versions of their new releases.
- The 6128's only rival at the moment is the CBM 128. But although the Amstrad cannot match the CBM 128 for games software, the 6128's monitor and disc drive give it a decisive edge.

WIN AN AMSTRAD 6128

Competition



Your chance to win a 128K microcomputer plus disc drive plus monitor — all this, and it can run CP/M with its wealth of applications software too! It can only be Amstrad's 6128, exclusively reviewed this month. All you have to do is put yourself in the place of someone writing a book entitled "1001 uses of a disc drive". Dream up one thing you might use your disc drive for — it can be serious or silly — and send us a description and/or a drawing of your idea.

RULES

- The winner of the competition will be the person who, in the view of the editor, comes up with the most amusing or original use for a disc drive.
- The name of the winner will be printed in the December issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in September 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Business Press International or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- Business Press International assumes no responsibility or liability for any complaints arising from this competition.

YOUR COMPUTER COMPETITION

Don't forget to enclose this coupon, or a photocopy of it, when you send in your idea for an original use for a disc drive to 6128 Competition, *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Name ____________________

Address ____________________

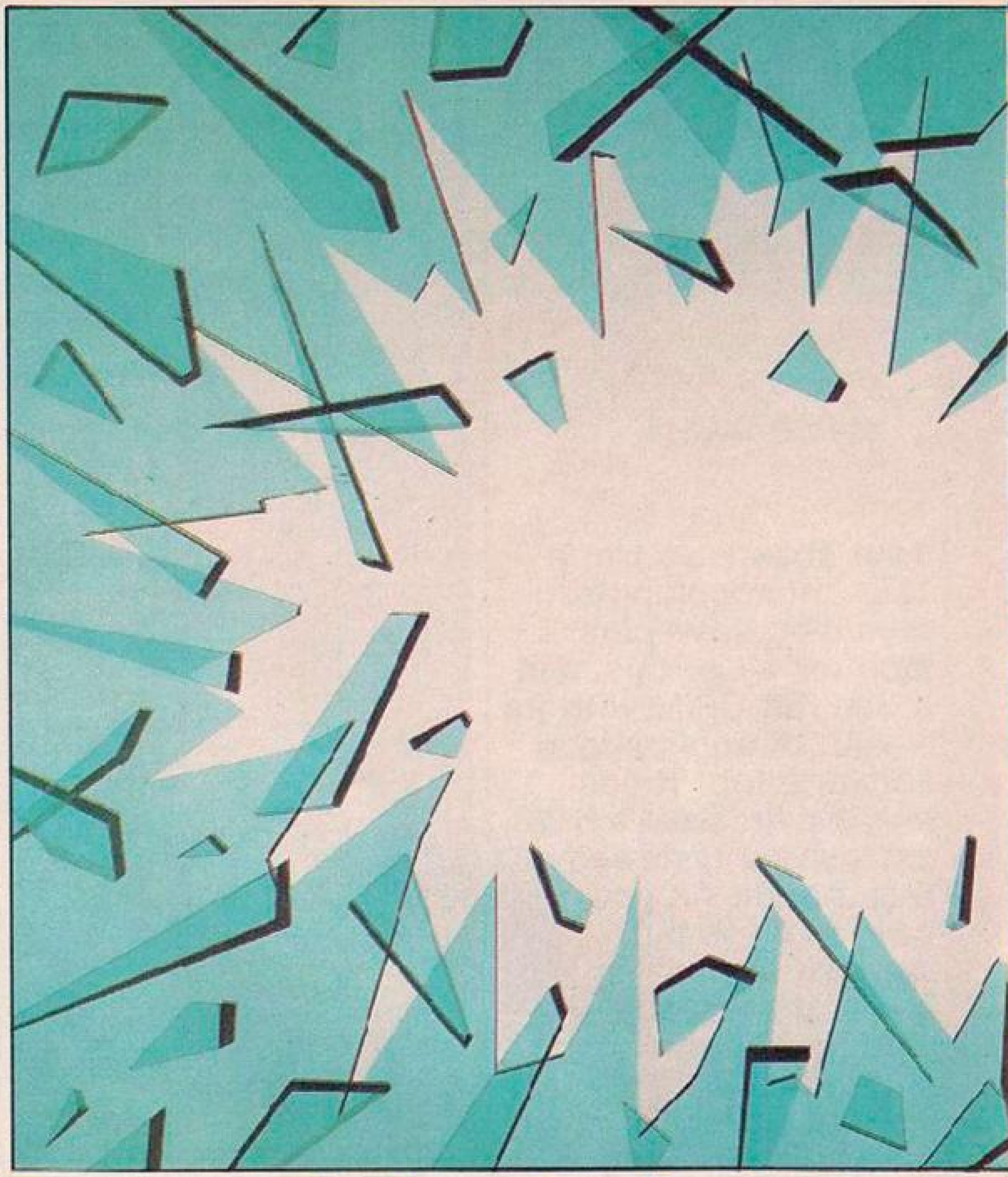
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Idea (written or drawn, use extra space if necessary) ____________________

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6128

Lee Paddon enters the dank and mysterious depths of a Telecom mainframe and discovers the eerie world of MUD.



MUD CHALLE

HOW DO YOU recognise a Wizard? Not as you might have thought by the pointy hat, billowing gown and flowing white beard. More reliable pointers are bleary bloodshot eyes, a tendency to fall asleep, and a phone bill as big as Boris Becker's pay cheques. All these are sure signs that he is up to his eyes in MUD, or to give it its full title Multi User Dungeon.

Night after night poring over a hot modem have taken their toll. Adventure games have been around since Crowther & Woods discovered that you could do something more exciting with a computer than scare old ladies out of their wits by sending them gas bills for three million quid. They wrote Classic Adventure and thus a genre of computer games was born. The genre must now be relegated to the status of SUD, or single user dungeon. These are basically passive, and once you have solved them, however long that might take, they are consigned to the bin.

What they lack is interaction. Picking up the gem in the treasure room will always produce the same result. With MUD, all this goes out the window. It won't be just you down there. Along with the usual perils, monsters and prizes there will be up to a hundred others trying to help or hinder you. So how do you get into MUD? Your first step is to get yourself a MUD pack.

This contains a map, a security card with ID and password, instructions and 30 credits, enough for three hours. After that, its 20p per unit which lasts six minutes. Armed with this, your micro, a modem and some software suitable for accessing bulletin boards, you are all set to descend into the depths.

If this seems like an expensive way to play adventures, perhaps a brief run down on the specification might convince you otherwise. The labyrinth consists of over 1,000 locations and over 60 commands are initially available. On first entering MUD, you are a novice, your ultimate aim is to make the grade of Wizard. To make your way to the top you need experience points. You get these for killing monsters and finding treasures. You also get points for killing any fellow adventurers that you might find hanging about the place, and this is where the interactive nature of MUD starts to come into its own.

When you are in the dungeon you can ask which other players are logged on to the system. When you meet them it's up to you how you approach them. Exchange hints, team up, or just beat the hell out of each other. Another breed of animal you may meet on your travels is a mobile. This will seem like another player, you

MUD: once upon a time . . .

MUD was originally written by Roy Trubshaw at Essex University about five years ago. Ever since then it has undergone expansion and revision under the watchful eye of Richard Bartle. It quickly became a cult with the students of the university, and began to take off nationally when Essex installed PSS facilities for the computer.

Despite access hours that meant becoming virtually nocturnal, it has become an obsession for many, some Wizards clocking up many hundreds of hours on line. As with any cult, myths have grown up around the game.

There was a craze for a time of combining MUD and Trivial Pursuit, with Wizards shouting out the questions, and right answers being rewarded with snippets of useful information. There was even a MUD wedding, between Kate, alias Margaret Lawton from Liverpool and Frobozz the Wizard. All the other characters were invited, the Christmas box was raided for suitable bunting and the wine flowed.

After the celebrations Kate & Frobozz retired to the Wizard's Chamber, and what interaction occurred thereafter is unknown.

The new improved MUD has been developed by Richard Bartle. It had first to be converted from the Dec it ran on at Essex into Mudcl, which made it machine independent, and then vastly enlarged and improved. MUD veterans will find at least some of the new MUD familiar, it incorporates the old dungeon. As time goes on, further improvements and enlargements are planned.

If you are an adventure freak, then you won't want to miss out on MUD, it'll knock the froth off your SUDS.



M.U.D

MULTI USER DUNGEON

will even be able to have an Eliza style conversation with it.

As time goes on, your experience and powers will grow. There are 60 different spells which are available to you from the word go; however, you will have little chance of successfully casting them. As your level increases, so does your chance of casting a successful spell, until you reach the ultimate level of Wizard/Witch where you are virtually immortal and all-powerful. Once you attain these dizzy heights, life becomes more a question of wielding absolute power, deciding which of the pitifully struggling Novices and Champions you will favour.

This whole anarchic system is policed by the Arch Wizards, alias the Sys-ops who keep an eye out for maverick Wizards going insane with power, and also the odd common-or-garden hacker. The ultimate in Wizard luxury is some software from Jez, author of the Demon Zrom. This gives you a separate window giving information over any player the Wizard is tracking.

Another attractive aspect of MUD is the user-friendliness of the system and the successful creation of atmosphere by the text descriptions of locations — very much in the spirit of *Dungeons and Dragons* (TM).

MUD is due to hit the fan after its official launch at the PCW show. Even better news is that it won't cost you a thing, apart from the phone costs. It will be available between 6pm and 8am weekdays and all day at weekends. This trial period will end on November 5th when the most successful MUD slingers will be invited down to the London Dungeon for a MUD spectacular.

These are promised as regular events and basically the system is locked so that no one can get in out, and then battle is joined. When the dust clears the survivor staggers out victorious. The bad news is that after the November 5th spectacular, every one will be busted down to novice level, and the battle commences in earnest, at the full rates.

Simon Dally, managing director of Multi-User Entertainments (MUSE) who market MUD worldwide, hopes that this initial trial period will get people hooked on MUD and also get any remaining bugs out of the system. Initially the system will be run from London, and there are no plans at the moment to make a Packet Switch gateway available, so would-be Wizards from the provinces might find things a bit expensive.

Simon Dally sees a rosey future for this new concept in computer games. "Our Mud development language — Muddl — will allow anyone to come to us with an idea for an interactive type of game, and Muddl will allow us to implement it quickly and cheaply. We are certainly a long way ahead of the States where Megawars III, a rather limited interactive game, is going down well, and we have high hopes of selling MUD to the Americans."

NGE

MUD COMPETITION

This month's prize is a MUD pack, plus on-line tuition from an arch Wizard on the arcane mysteries of the game. Thus equipped, you will be ready to take on nine other champions at the first MUD spectacular on an all expenses paid trip to the London Dungeon on November 5. Once there, the system will be locked, and the entrances sealed until one champion emerges triumphant. The prize for this champion of champions will be either 100 free hours of MUD'ing, or £100 cash, with free MUD time for the runners-up. For the runners-up of the *Your Computer* competition, there will be prizes from Firebird's popular Silver range of software. In return, all we ask you to do is sketch out a scenario for a new adventure which would exploit the interactive features of MUD. You must explain what features of your adventure would require the players to interact with one another. Don't forget, you'll need a computer, a modem, and appropriate bulletin board style software to play MUD.

Don't forget to enclose this coupon, or a photocopy of it, when you send in your idea, which can be written or drawn or both, to *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Name ______________________

Address ______________________

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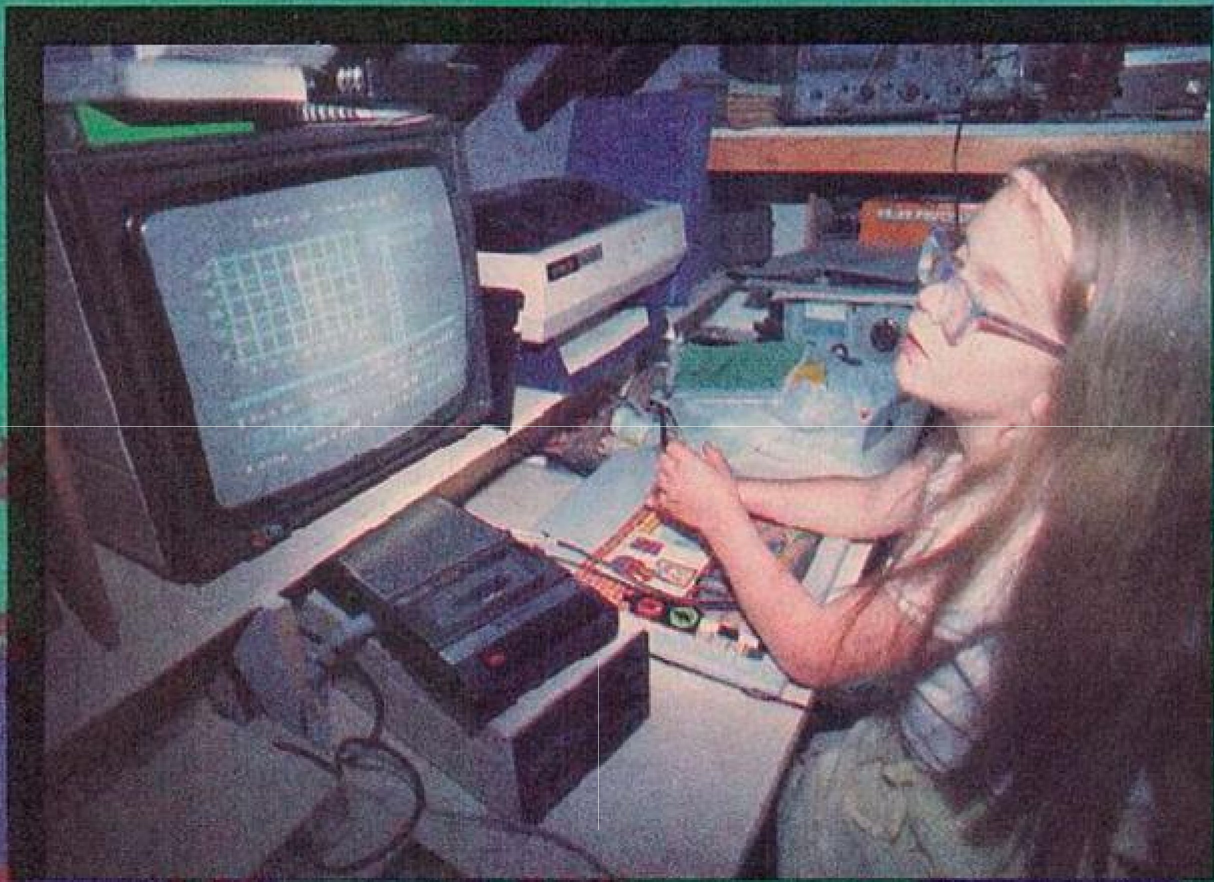
Written or drawn idea for new interactive adventure — use extra paper if necessary.

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- BPI assumes no responsibility or liability for any complaints arising from this competition.



GRAPHICS PADS.. PENS.. DIGITISER

John Dawson trips the light pens fantastic, plus graphics pads and a budget digitiser.

ANIMATED AND still computer generated pictures are used in feature films, commercials, cartoons and advertisements. Computer assisted design is big business for architects, engineers and large computer software houses. There is a vast range of diagrams, pictures, plans and shapes that can be drawn for different purposes.

You may want to draw a two dimensional chart using bars, lines, pie segments or symbols, a circuit diagram for a piece of electronic equipment, a printed circuit board layout, a three dimensional plan for a house extension or an engineering blueprint to give to a toolmaker.

Graphpad is a graphics pad which can measure the position of a stylus in two axes and return the X and Y co-ordinates to the computer. The version of Graphpad that I examined was intended for use with the BBC micro but other versions, with different software, can be used with a number of other machines. The pad draws its power from the BBC microcomputer.

Comfortable to use

The Graphpad weighs only one kilogram and is 14 by 10.25in. with an effective drawing area of approximately 10.5 by 7.5in. The drawing area is a little smaller than a piece of A4 paper and that can be very convenient for transferring diagrams to the computer. One lead from the pad is connected to the user port of the BBC microcomputer and a second lead runs from the left hand side of the pad to a lightweight stylus or pen.

The pen is comfortable to use and has a metal tip which presses on to the perspex overlying the surface of the graphics pad. The manufacturers suggest that you should place this sheet on the surface of the graphics pad for the best results. There is a microswitch inside the body of the pen and the cursor appears on the screen of the computer VDU when the tip is pressed. If you press the pen tip when it is not pressed down on to the pad the cursor moves randomly on the screen.

British Micro supplies three programs on disc to accompany the graphics tablet. The first prints the X and Y co-ordinates of the pen on the VDU screen and the second program is a general purpose drawing program with commands to draw lines, rectangles, triangles, circles and freehand lines.

You can fill any enclosed shape or the background, draw lines in three different widths, save and load drawings to disc or tape and print a drawing in positive or negative using a screen dump routine for the Epson MX and FX series printers. The third part of the software is called a "CAD" program.

CAD stands for Computer Assisted Design. Flexible manufacturing systems are just beginning to appear in which computer assisted design is the first part of the process. After drawing something that is to be manufactured, a new washing machine for example, on the screen of a computer, it should be possible to check the strength of various components or the validity of the electrical wiring diagram using a separate computer program.

When the design has been confirmed, the computer should generate instructions to be sent to numerically controlled machine tools that will press metal panels, machine rotors and wind armatures for electric motors, weld sections of the case and lay wires in a wiring jig to form the cable harness. By changing the program that's sent from the CAD computer the product can, in theory, be turned from a washing machine into a dish washer or tumble dryer.

The Graphpad CAD program is not a competitor for the Automatic Dishwasher Designer Award 1986. It is actually quite disappointing for all you can do is design a series of shapes on a 16 by 16 grid, place these into a number of pigeonholes and then arrange the scaled down shapes on the screen linking them with lines. It is not possible to alter the scale of the shapes once they have been defined, nor can you add text to the diagram for labels or titles. Despite being able to place a grid pattern on the VDU to help with the alignment of various shapes, I found it quite difficult to drag the shapes or icons to precisely where I wanted them.

I liked the Graphpad hardware for its neat, robust design and the drawing program worked well. There is a listing of the drawing program at the back of the instruction manual and it should be easy to extend or modify this to suit your own requirements. The CAD program was disappointing.

The sensitive area of the **Touchmaster** graphics pad is exactly the same size as a piece of A4 paper. The Touchmaster is self powered by its own mains plug/transformer and must contain a dedicated microprocessor. Both serial and parallel ports are fitted to the back of the case and there is a socket for a foot switch as well. The short handbook supplied with the pad shows how it can be connected to popular machines such as the BBC micro, CBM-64, Dragon 32/64, Spectrum and Vic-20.

In the case of the BBC micro, a lead connects the touch pad to the RS-423 serial port. Unlike the other touch pads and light pens, the Touchmaster outputs X and Y co-ordinates as information that can be read as the equivalent of a key stroke in a Basic program. All you need to include in your programs are the following Basic instructions:

```
10 *FX 2,1
20 *FX 7,7
30 *FX 21,1
40 IF (GET AND &7F) <64 THEN 40
50 X = GET*64 + GET
60 Y = GET*64 + GET
```

That's really not very difficult. Accessing the RS-423 serial port is also easy in machine code if you need the whole system to run faster than is possible in Basic. Interfacing the Touchmaster is very easy and the use of the serial port may well avoid clashes with other peripherals — it is at least easier to plug and unplug leads to the serial socket than to the user port. The resolution of the Touchmaster pad is not stated in the user instructions.

Multipaint was supplied on cassette. It works well and is a lot of fun to use. Probably it's the best simple drawing program that I've found for the BBC. The program is written in Basic and can be modified to suit your own needs. Unfortunately, I couldn't get Simon's Squares to load but Word Search entranced my six year old younger daughter. The program requires concentration and as good a memory as you can manage.

The instructions contain a couple of mistakes but the bright overlay for the touch pad works well with the screen display. Spelli-copter was less successful, partly because the program requires a fiddly attention to the exact positioning of the helicopter carrying the letter you have to drop into place.

Pad has two switches

The **Saga Bitmap** is made in West Germany and plugs into an analogue-to-digital interface designed for use with the Kempston joystick on the Spectrum computer. The sensitive area is smaller than the other two pads — 5ins. by 3.75in. — but this didn't seem to make it more difficult to position the cursor where I wanted. The pad has two switches on the left hand side of the case that are used to tell the computer when you have a choice from a menu or set the cursor correctly in place.

The Touchmaster pad is set up with two soft "keys" at the bottom right side of the drawing area when you are using Multipaint and the Graphpad device requires you to press keys on the computer keyboard. I preferred the Touchmaster approach because you can concentrate on the pad and the screen without being distracted by the keyboard or a separate switch. Nevertheless I liked the consistency and feel of the Bitmap pad while I was using it with the **Saga Style** program.

Style can be used with either the Bitmap or a joystick. The program can be transferred to a Microdrive. It has all the usual facilities for drawing lines, rays — multiple lines from a single point — circles, triangles, boxes, freehand shapes and freehand points. You can fill any enclosed shape and can unfill the shape if you make a mistake.

The most advanced facility allows you to zoom into a section of the picture, alter individual pixels and then zoom out again. Other utilities provide for solid or shaded fill, localised or universal colour changes and two different brush types.

The Touchmaster Multipaint program has more brush styles and widths and will draw regular polygons with between three and nine

EQUIPMENT AND SOFTWARE MANUFACTURERS

GRAPHPAD — BBC
Supplied with:
XY coordinates program
Drawing package
CAD program
British Micro, Penfold Works, Imperial Way, WATFORD, Hertfordshire WD2 4YY
Telephone: 0923 48222

TOUCHMASTER — BBC, Spectrum, CBM-64, Vic 20, Dragon
Supplied with:
Multipaint drawing package
Also supplied for review:
Spelli-copter, Simon's Squares, Word Search
Touchmaster Ltd, P.O. Box 3, Port Talbot, West Glamorgan SA13 1WH
Telephone: 0656 744770

SAGA GRAPHICS PAD — Spectrum
Also supplied for review:
Style
Saga Systems Limited, 2 Eve Road, WOKING, Surrey GU21 4JT
Telephone: 04862 22977

DATAPEN — BBC, Spectrum
Supplied with:
SKETCH — Drawing program
SHAPE
INTRO
Also included for review:
DEFINE — Sprite designer and animator
BRITAIN — Map of the UK with questions and lightpen answers
CIRKWIK — a program for drawing electronic circuit diagrams
Datapen Microtechnology Limited, Kingsclere Road, OVERTON, Hampshire RG25 3JB
Telephone: 0256 77084

PLOTMATE — BBC
Supplied with:
Main system disc and utilities
Demonstration character set and 'enter data and plot program'
Vibrating string displacements
Rainfall chart
Function keys reminder
Map of Britain
Also supplied for review:
LINCAD — Technical drawing package
LINTRONIC — Electronic circuit diagram plotting program
LINCHART — Bar and pie chart program for plotting flat and 'solid' charts
Linear Graphics Limited, 28 Purdeys Way, ROCHFORD, Essex SS4 1NE
Telephone: 0702 541664/5

ANIROG SUPER SKETCH PAD — CBM-64
Supplied with:
Super Sketch starter kit
ANIROG, Unit 10, Victoria Industrial Park, Victoria Road, DARTFORD, Kent DA1 5AJ
Telephone: 0322 92513/8

LEONARDO — Spectrum
Graphics package
Creative Sparks, Thorn EMI Software

sides. These things apart, the two programs are very similar. Unlike Graphpad, neither will dump a drawing to a printer.

The **Anirog Super Sketch — Model G2100** works on different principles to the graphics pads that I have described so far. A long arm protrudes over the drawing area from a housing at the top of the pad. The position of the stylus at the end of the arm is calculated from the rotation of two potentiometers inside the housing. The arm has a geared track underneath and this provides information about how far the stylus is up or down the pad while the rotation of the arm provides the other signal. Buttons on the top housing can be used to Select a function from a menu displayed on the VDU, "Lift" the pen from the pad — electronically at least — and return to the Menu. The software supplied with the Anirog sketch pad works well and has a couple of unique features.

"Undo" will erase the work you have done since the menu was last displayed and "Mirror", "Quad" and "Flip" will split the screen and copy what you are doing either to the other side, into the three other quarters, or from top to bottom. That's a good way to achieve symmetrical drawings and the undo command is much easier to use than the erase functions in most of the other packages.

I didn't like the mechanism in the Anirog sketch pad particularly after using the Bitmap and Touchmaster graphics pads. I would be concerned about wear developing in the gear mechanism that turns the potentiometers and the steadiness that you might appear to gain from the arm as opposed to the free pen didn't help my two children to draw straighter lines.

However, the Anirog sketch pad works perfectly well and the drawing package is perfectly adequate for designing pictures and saving them on tape or disc. The manual suggests that photographing the screen is one way of reproducing what you have created.

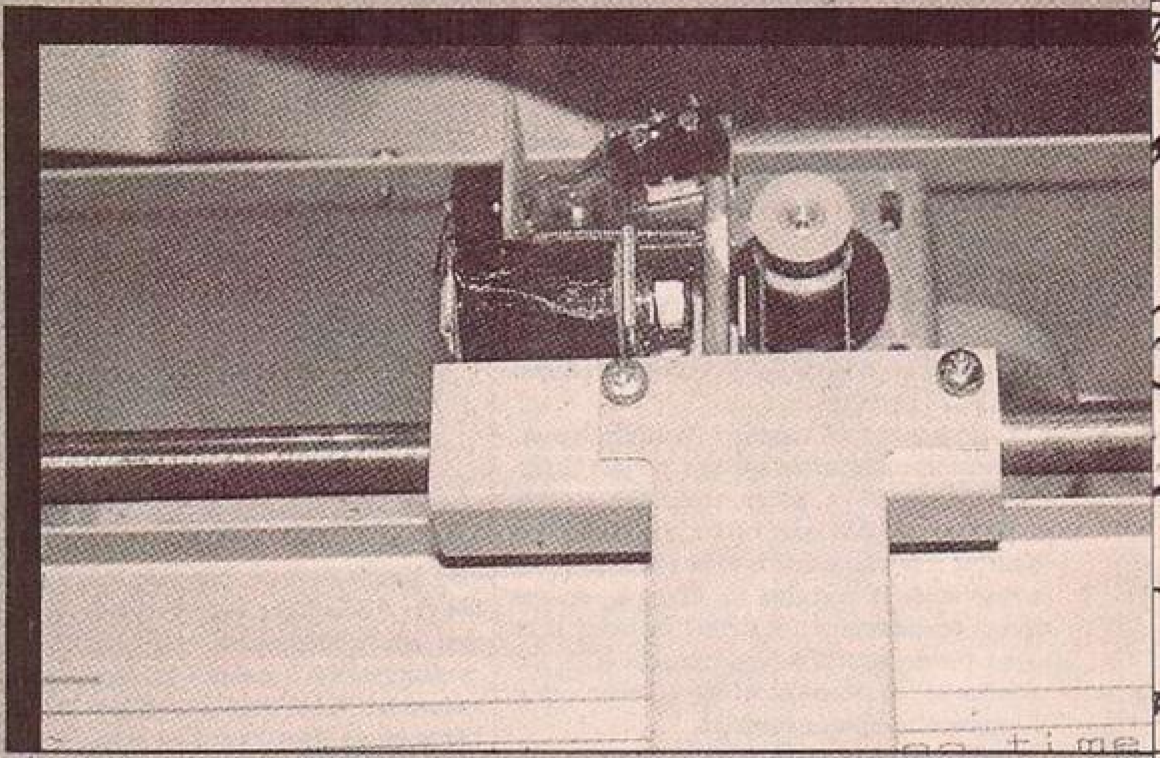
Well made unit

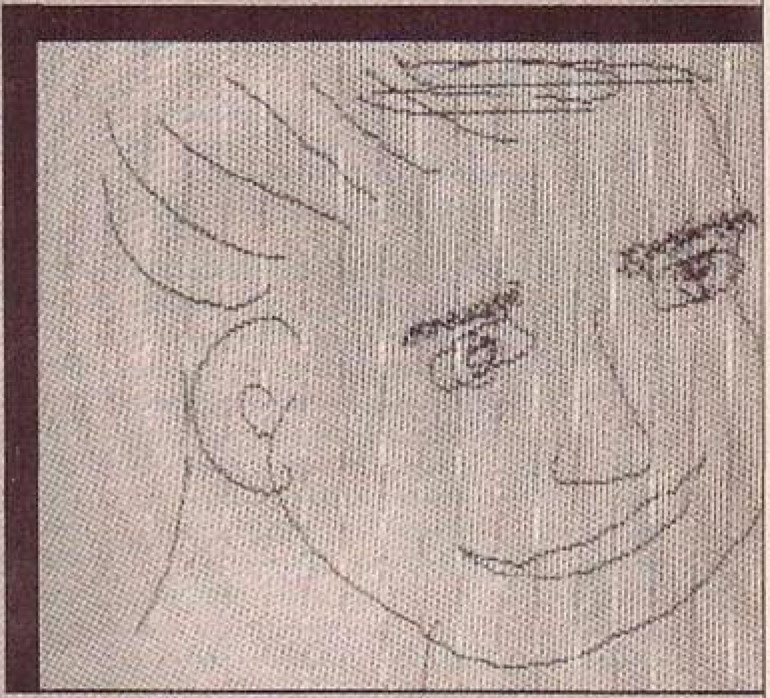
A light pen is a device which detects when the spot of light on a scanning visual display unit — an ordinary TV or monitor — has passed underneath the sensor. In conjunction with software or hardware, the CRTC chip in the BBC micro, the position of the lightpen on the screen can be determined and the information fed into a program running in the computer.

The **R H Lightpen** is a well made unit. The body of the pen is a slim, comfortable to hold, cylinder with a red LED at the back of the pen — facing the user — and a tapering nozzle at the front. A flexible lead connects the pen to a metal cased unit that connects in turn to the analogue port of the BBC microcomputer.

The software included with the R H Lightpen consists of a number of procedures that can be incorporated into your own programs in addition to two good games which are played with the lightpen. The drawing routine works in Mode 0 and is much simpler than the software provided with other products. However, R H Electronics also produce a program known as Art Master.

Two versions of the **Datapen** were sent for review. One connects to the A to D port on the BBC microcomputer and the other is connected to a socket which plugs into the bus on the back of the Spectrum. It is not possible to plug another unit on to the back of the Datapen connector — it must be the last item in the stack. The Spectrum version of the pen can be used with both the 16K and 48K computers although the programs to save a picture to tape and load it back in again have to be loaded separately if you have the 16K machine.





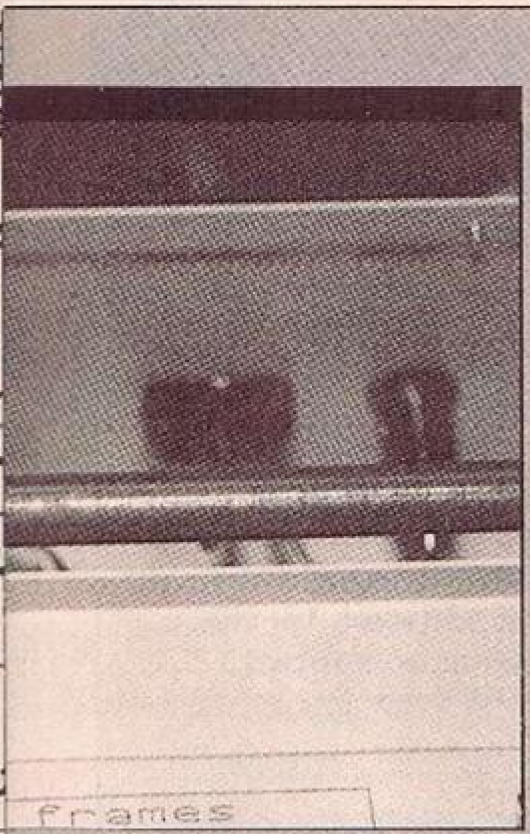
A lot of software was supplied with the Datapen. You can create teletext screens, animate sprites — this is great fun — play a quiz about the British Isles and draw pictures. Cirkwik is a disc based program that allows you to create circuit diagrams for electronic, hydraulic or pneumatic circuits, flow diagrams or any other drawing that requires only symbols and lines drawn at rightangles.

Multiple screens can be linked together to produce a diagram four screens wide by two screens high and up to 640 different symbols can be used in the course of preparing a diagram. Cirkwik is really rather like a graphics word processor in which symbols are placed in position and linked by lines. If you change one symbol in the symbol table, each occurrence of the symbol in the diagram will also be altered.

The **Plotmate** plotter is a delight to use. It is a flatbed plotter where the pen is moved in two dimensions. Other machines, the Epson HI-80 for example, move the pen in one dimension and the paper in the other. The Plotmate will handle card or thick paper that will stop the Epson dead in its tracks. The penalty is the Plotmate's greater size — 15 by 14 by 6.5in.

The Plotmate is very solidly constructed with a steel case that will take a lot of wear and tear. The plotting mechanism reminds me of the standard of manufacture you find inside a commercial Qume or Diablo daisywheel printer — intended for continuous use over prolonged periods. Despite this reassuringly massive feel, the Plotmate weighs only 6.5 Kilograms.

There's so much you can do with the Plot-





mate that it's impossible to cover it all in part of one article. I hope to write about the Plotmate in much more detail later in the autumn. However, for the moment here is a selection of the facilities that come with the basic machine:

- The VDU 23,255 instruction can change the logical colour on the VDU and can be used to prompt the user to change the pen colour in the Plotmate. Black, Red, Green, Brown, Blue and Violet pens are available.
- Text can be plotted in different sizes, orientations — up, down, left to right and right to left — and four different slants — italics. The VDU 23,255 instruction accepts parameters to modify the character height, character width, character slant, character orientation, pen speed, shading and broken line patterns and scale. One more parameter controls functions such as upside down plotting, setting the plotter origin and toggling the colour change prompts.
- You can fill triangles and other blocks quite automatically with either solid colour or a large variety of less dense or broken lines.

Plotmate gets its data by intercepting the commands in the OSWRCH channel and sending them on afterwards to the BBC micro operating system. One version of the plotter driver is designed to be located just below the Mode 4 screen RAM, another leaves more room for your Basic program but does not permit simultaneous plotting on screen and to the Plotmate.

You can run the Plotmate driver with the second processor leaving all the secondary Ram free for your programs. The Plotmate driver can be loaded from within a Basic program when you require it by simply changing HIMEM and using the instruction

*RUN H.PLTMATE

Finally, you can directly access routine to move the pen, and generally control the plotter in both Basic and machine code.

The figures show how a screen display can be transferred to the plotter. The programs to produce both diagrams are standard Acornsoft software from the Creative Graphics and Graphs and Charts packages run with Plotmate in operation. The map of Great Britain and the circuit diagram were produced by demonstration programs supplied with the plotter.

The **Print Technik Digitiser** is a small box that plugs into the user port of the CBM-64 computer. The digitiser works by sampling a number of video frames and building up a picture in four levels of brightness in the computer memory. The stored picture is 256 by 256 points in size and 150 by 200 points are visible on screen at any one time.

You can assign different colours to each of the grey levels and can run a separate program to resolve 16 levels of brightness for special purposes. Once a picture has been acquired by the digitiser, the device can be disconnected from the computer and the image manipulated by the software alone.

The image can be dumped to black/white and colour dot matrix printers and may also be 'edited' using a light pen. Another program in the package will detect a change in the digitised image and sound an alarm if certain parameters are exceeded. The Print Technik digitiser was easy to set up using a Panasonic A2 camera and Panasonic NV 180B video recorder as the signal source.

The pictures were clear although the camera and the object must both be kept stationary as the digitising process takes three or four seconds to complete. It's very clever and a lot of fun.

There is one graphics package for the Spectrum that doesn't cost a lot of money and is more sophisticated than the other drawing software included in this review. **Leonardo** can draw in three dimensions and has a 'programmed draw' facility for drawing patterns, shapes, singly or repetitively, with scale expansion, translation or rotation. The rotation increment can be set to any number of degrees unlike many other programs which cope only with rightangle changes. Leonardo will work with the keyboard alone or any of the popular Spectrum joysticks.

PRINT TECHNIK VIDEO DIGITISER — CBM-64
Supplied with:
Program suite to capture video picture, edit the picture, store picture on disc, dump a picture to dot matrix printer
CRL Group PLC, CRL House, 9 Kings Yard, Carpenters Road, LONDON E15 2HD
Telephone: 01-533 2918

R H ELECTRONICS LIGHT PEN — BBC
Supplied with:
Light pen utilities
Draughts game
Kwartet game
Mode 0 free hand drawing program
Swan — Mode 2 picture
R H Electronics (Sales) Limited, Chesterton Mill, Frenchs Road, CAMBRIDGE CB4 3NP
Telephone: 0223 311290

COMPUTER ART AND GRAPHICS — How to program with personal computers
Written by Axel Bruck
Published by Paul Petzold Limited
London (1984) ISBN 0-946970-06-8

CONCLUSIONS

- A lot of software has been written for onscreen graphics displays on most of the popular microcomputers. Plotmate can use those programs directly to transfer data from the BBC screen to the plotter.
- Graphics tablets or pads have been available for some time for minicomputers and big, serious jobs. Until recently they came with big, serious prices attached to them so the Graphpad, Touchmaster and Bitmap are all good value for money as peripherals.
- Leonardo is the best drawing and painting program for the Spectrum and you don't even need a joystick or a graphics pad.
- Axel Bruck's book *Computer Art and Graphics* is superb. It illustrates magnificently how a computer can be used to draw complex repetitive patterns that appear to have depth and perspective. The explanation and programs in the book can be adapted to draw and plot almost any shape. But that is done by entering figures that describe the various lines and movements necessary to construct the shape. None of the software included in this review will allow you to draw a diagram in three dimensions on the computer's screen with either a graphics pad or a light pen and then rotate or scale the figure to suit your needs.
- The video digitiser could be useful for preparing sales literature or catalogues where you want to include a picture of a piece of equipment or a logo into the middle of a text. It is certainly great fun to play with but remember you'll need a standard source of video signals, an ordinary video camera for example, to feed the device.
- For my purposes I would buy an R H Electronics lightpen or the Graphpad or Touchmaster graphics pad and couple that to the Plotmate, writing the software to manipulate the data with the help of Axel Bruck's book.

EDUCATION: REPLACING TEACHER

Software or swotware? Josephine Adams' end of term report reviews the class.

WHAT MAKES A good piece of educational software? Ask 20 different people and you'll get 20 different answers. To the parent, it has to help their children be better scholars and get a better job. To teachers it adds something to their task that would otherwise be difficult, impractical, or even impossible. To the kids, it makes what is usually boring a bit more fun. To the supplier, well, the educational label can give an indifferent program credibility and so possibly greater sales. But unfortunately to most people, it means very little at all!

1981 marks the beginning of the computers in education boom. With government help, schools started to equip with micros, namely, the BBC — plus the Research Machines' 380-Z and 480-Z with a few Spectrums to boot.

Unfortunately, the software of that era did more than anything to put teachers off using computers — not that many of them were keen anyway. Chalk and talk could achieve much better results than most educational software of the day. In retrospect, it was asking too much for it to have been otherwise.

Programs performed on screen what the teacher did in class — except not as well. The dreaded drill and practice program dominated: the computer asks a question, the children answer it and, if they're lucky, receive a graphical reward sequence — a big screen tick.

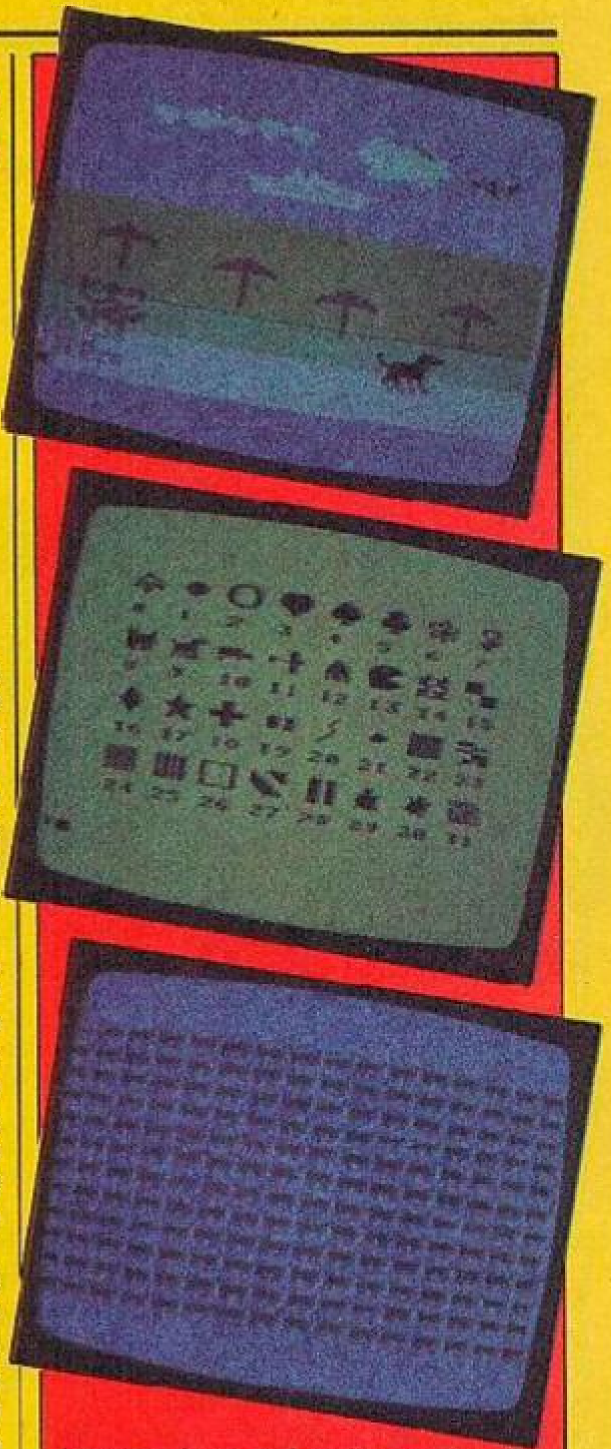
But the situation has improved, dramatically. Over the past year or so, teachers and suppliers have got together to develop some very exciting applications.

Lessons have been learned: the computer can do some things well — not everything — and these areas have been exploited. Where educational software has succeeded, the results have been spectacular.

Consider these examples: remedial English. The mechanical ability to write is not there so the creative expression has dried up and the desire to learn with it. Enter word processing. Perfect hard copy every time thanks to a few basic functions — insert, delete, search and replace. The BBC Micro, currently the standard machine in education, supports quite a few good word processors, though none better than Computer Concepts' Wordwise Plus.

Or, history. How can you get a real feel for life in the Viking era? Enter the historical simulation. Decisions have to be made based on conditions of the time — the outcomes of which have no less significance in the 20th century than they did in the 10th. In case you're wondering, there is in fact a wonderful program from Fearnleaf called The Vikings.

Let's stay with the humanities and take a look at geography. One of the best collections comes from BBC Publications, called Introducing



Logotron Logo and sprite creation. Top, arcade graphics using simple Logo commands. Middle, this Logo can handle up to 32 sprites at a time. Bottom, multiplying cats.

(continued on next page)

WARNING: COMPUTER STUDIES CAN DAMAGE YOUR FUTURE!

One: a home computer is not really going to help youngsters get a job because all they want to do is play games. Nothing wrong with that, there are some marvellous games around and the entertainment aspect of the computer at home is its main appeal.

Two: computer studies as taught in the majority of schools is almost completely irrelevant to what goes on in the real world. That, I hasten to add, is not the fault of the teachers but the exam boards. Whether the O or A level computer studies candidates go into higher education or employment, they will have to unlearn what they have acquired so far and then tackle what is being asked of them.

Employers rarely want Basic programmers; they want people skilled in Cobol, Fortran and assembly language. Universities and polytechnics don't give a hoot for Babbage; they demand a working knowledge of Winchester hard-disc systems, protocols for computer communication, user-friendly software interfaces . . .

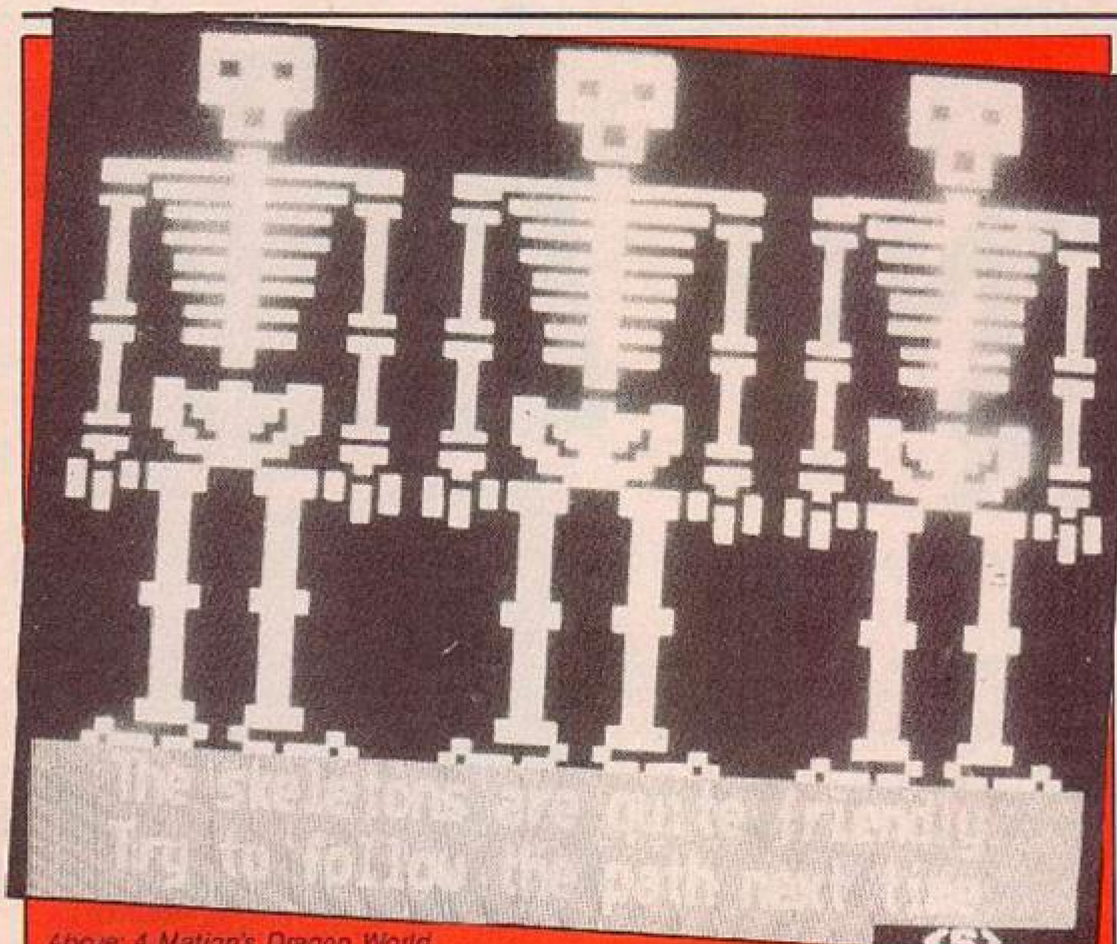
Three: social interaction, organisational skills, people management are all more important than the vast amount of technical knowledge believed to be necessary when working with computers. A number of educationalists are becoming rightly concerned with the computer junkies, the increasingly common place of youngsters becoming hooked and ignoring everything else in life. If you can't communicate effectively with other people, you will be seriously hindered in your working life, whatever you choose to do.

This is not meant to be pessimistic, just cautious. High expectations more often than not end up as disappointments.

One step in the right direction is the increasing number of training centres of one description or another which attempt to meet specific needs above and beyond conventional educational institutions. ITeCs (Information Technology Centres) are springing up all over the country and provide courses for predominantly unqualified 16 and 17 year olds in various aspects for computers from viewdata editing to word processing.

Within schools themselves, an initiative has been introduced by the DES to cater for the broad range of skills required within the hi-tech industries ranging from computer-aided design to electronic engineering. This is the so-called TVEI scheme or Technical and Vocational Education Initiative.

A skills shortage undoubtedly exists where jobs remain unfilled because so far inadequate attention has been paid to meeting industry's requirements. Those jobs are not for programmers but for creative technical people: I've seen many primary school children with the potential to meet those needs, if only Rank Xerox, ICL and others can wait 10 years or so!



Above: 4 Mation's Dragon World.

(continued from previous page)

Geography. Four programs take you through different aspects of the subject via simulations of a nomadic lifestyle, an expedition to Everest, a river journey and an airline flight: all first-class learning materia..

Maths has always been considered an appropriate subject for the computer. For the early years of school, there are a couple of outstanding programs that are a must for any primary school software library. The first is called Maths with a Story (BBC Publications); the second is Cars — Maths in Motion from a highly respected educational software supplier, The Cambridgeshire Software House.

But computer assisted learning aside, there are new opportunities for learning that the computer and its software have created. This is the real breakthrough.

One example, and perhaps the best, is Logo. All the common home computers have an implementation of Logo though the better ones are Logotron Logo for the BBC Micro and Atari Logo.

Logo basically offers the young computer user the chance to explore for themselves the world of maths, programming, computer graphics and control. In school. it can form the basis of a year's work; at home, it means hours and hours of fun — much more so than the average game. And it's very educational!

Another example is information handling. Success in this world depends on the individual's ability to manipulate information not to store it: to find it, collect, retrieve and interrogate it. It is here that being able to use a computer may help its user to get a good job.

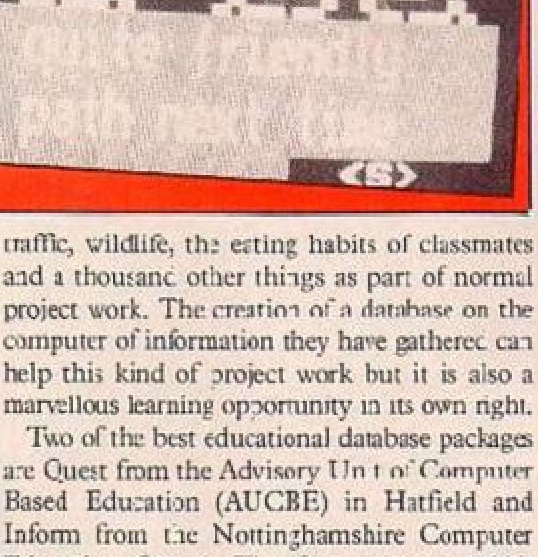
Forget programming, systems analysis and computer science; computers will soon be able to do all that for themselves. What is important is the information handling skill — the heart of the information technology boom.

It is here too that the computer fits most comfortably into other, more familiar, areas of classroom activity. Kids go out daily to survey traffic, wildlife, the eating habits of classmates and a thousand other things as part of normal project work. The creation of a database on the computer of information they have gathered can help this kind of project work but it is also a marvellous learning opportunity in its own right.

Two of the best educational database packages are Quest from the Advisory Unit of Computer Based Education (AUCBE) in Hatfield and Inform from the Nottinghamshire Computer Education Centre. The first runs on RML micros, the second on the Beeb.

In the primary school, adventures have proved to be enormously successful learning aids. Children work together in groups, share decision making responsibilities, delegate tasks — all very important aspects of a later, working life and things all too often neglected in exam-dominated syllabuses.

The spin-offs too are tremendous — creative and written work, even drama and music. With



Fantastic Voyage.

an average ratio of 20 kids to one computer, these associated activities are extremely important. The maestro in this field is 4Mation Educational Resources: little has generated as much enthusiasm or fun as Flowers of Crystal and Dragon World.

Another good example of an educational adventure is GSN's program called Merlin's Magical Shop. Within the package, you'll be hard-pressed to find the software. There's so much additional resource material, teaching suggestions, children's worksheets, documentation, etc. Really makes you feel you're getting your money's worth.

Helping to appreciate the natural world may be the last thing you would imagine the micro being any good at. But there are two brilliant pieces of software that do just that — Osprey from Bourne Ecucational Software and Suburban Fox from Ginn & Co.

In one, you just protect the precariously small osprey population in the highlands of Scotland from threats ranging from nosy tourists to natural predators. You really begin to understand what conservation is all about and what it's like to be an osprey. Surburban Fox takes the process even further — you take on the role of a fox: you live, breathe and survive as a fox.

All the software monitored so far is purely educational in the sense that it was designed for use in the classroom. But what about home education?

Well, home education software took off in the boom period when millions were rushing out to Laskys and W H Smith to buy their Commodore 64s or Spectrums. Making learning fun made money for suppliers like Mirrorsoft, Longman and Macmillan who all brought out some pretty good programs.

Other names also cashed in on the market with predominantly early learning games for the seven to 12 age group. A few braved the exam revision market like Collins and Penguin, but the majority of material was for the younger age group.

One of the few companies to remain successful in this field is ASK. Time Trucker, Podd and the latest in the line — Pazzazz — are all top quality programs. There are plenty of others too. There are versions of ASK software for most micros and at a reasonable price.

A couple of other good examples of, er, well, interesting software are Bodyworks and Fantastic Voyage. Remember the pop-up body book with the flapping lungs? Well, Bodyworks is an adaptation of that written in conjunction with Jonathan Miller. Available for the Spectrum, the graphics are tremendous. Both apply to Fantastic Voyage too — a similar program to Bodyworks but with much more of a game approach. Both will undoubtedly spur budding biologists to greater heights.

This represents but a small selection of what is on the shelves that is good and worth buying. But what will the next generation of educational software bring? One thing is for sure, it will have to be good to sell. Teachers and parents will soon acquire the confidence to discard what they know is rubbish and to demand what they know to be good; not only in terms of software but curricular and applications too.

Curriculum development — changes in what is taught in schools — is a slow, slow process. For the computer to be utilised to the full, the curriculum must change. It's beginning to happen slowly but surely in the form of new courses and qualifications. Take for example the diploma in microcomputer applications which is now being offered at a number of schools and colleges.

From Babbage and Basic, we've come to viewdata and spreadsheets — practical useful subjects with a real application to the outside world: a rare enough thing in schools. Courses of this type

have identified and addressed particular needs in the commercial world and in the pupils themselves. They are modular by design and combine applications such as word processing, database, financial analysis, graphics, videotex, etc., and upon successful completion are worth much more than the average clutch of O levels and CSEs. They also demand a new approach to educational software.

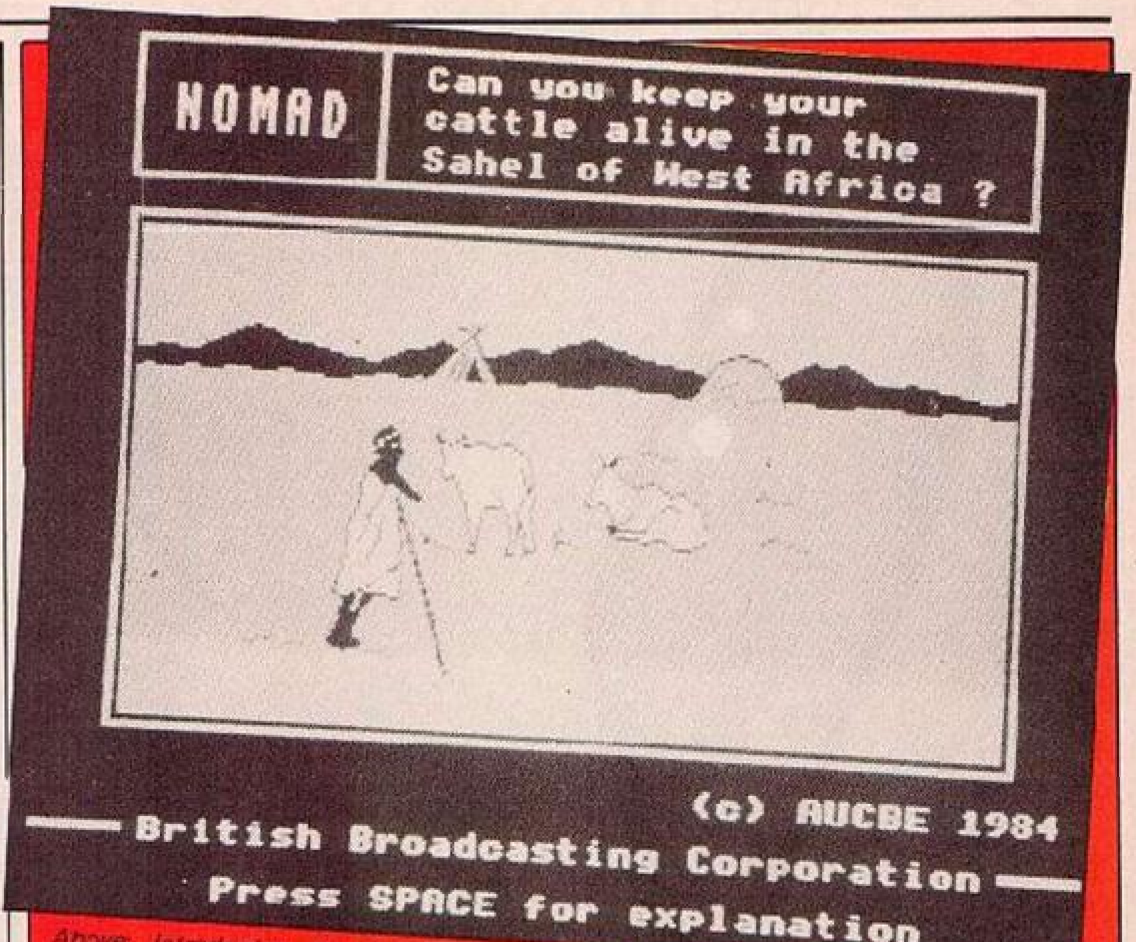
This brings us neatly to one of the major new developments within the educational field and elsewhere — the availability of cheap 16-bit computers. This combats two of the restrictions of current activities. The first is that working on machines like the RM Nimbus and Apricot F1E has direct relevance to industry where the same if not very similar machines are being used. So when you learn about word processing or databases, you're learning on the same machines with the same software as is in commercial use.

Also, writing decent, interesting and extensive educational software on the BBC Micro is not easy, as any software house will tell you. The machine is just not up to it. But with whizz-bang 16-bit graphics, speed and performance, developers will really be able to get their teeth into applications.

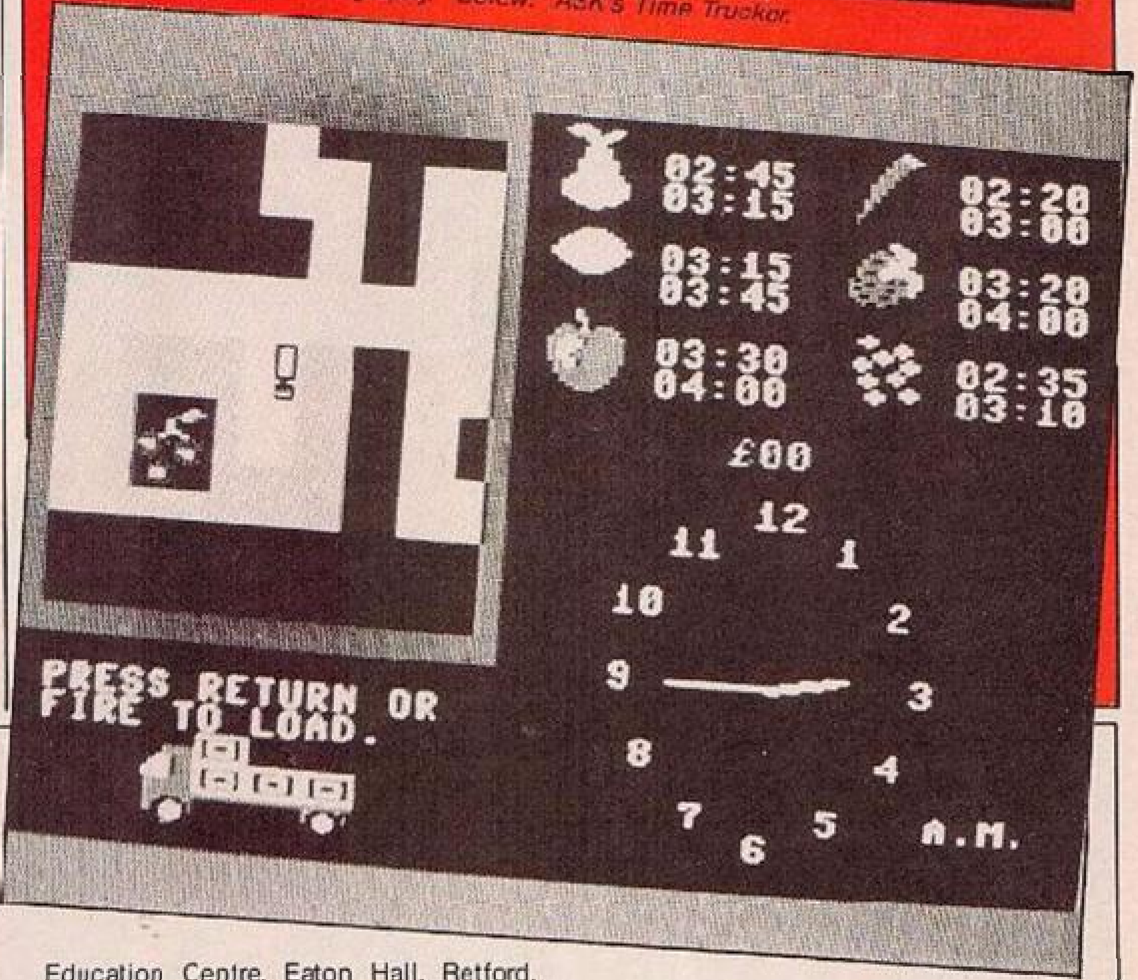
16-bit computing with its icon technology, high-speed graphics, large memory capacity and most important, ease of use, adds up to better software, better applications and a better learning environment.

What look like being the final push from MEP — the quango set up in 1981 to oversee educational computing — is in the area of 16-bit educational software development. Recently, a contract worth £25,000 was awarded to ASK to develop material for use in schools. If the company's present range of programs is anything to go by, the end result should be pretty good.

There are many scenarios for the school of the future but one of the most feasible is the increased amount of time pupils will study at home. A micro at home connected by phone to a larger computer elsewhere is a realistic possibility for home study. Many students with special educational needs use this kind of set up to undergo study because they simply can't attend school or college. If this became commonplace, we'd really see some advances in home education software.



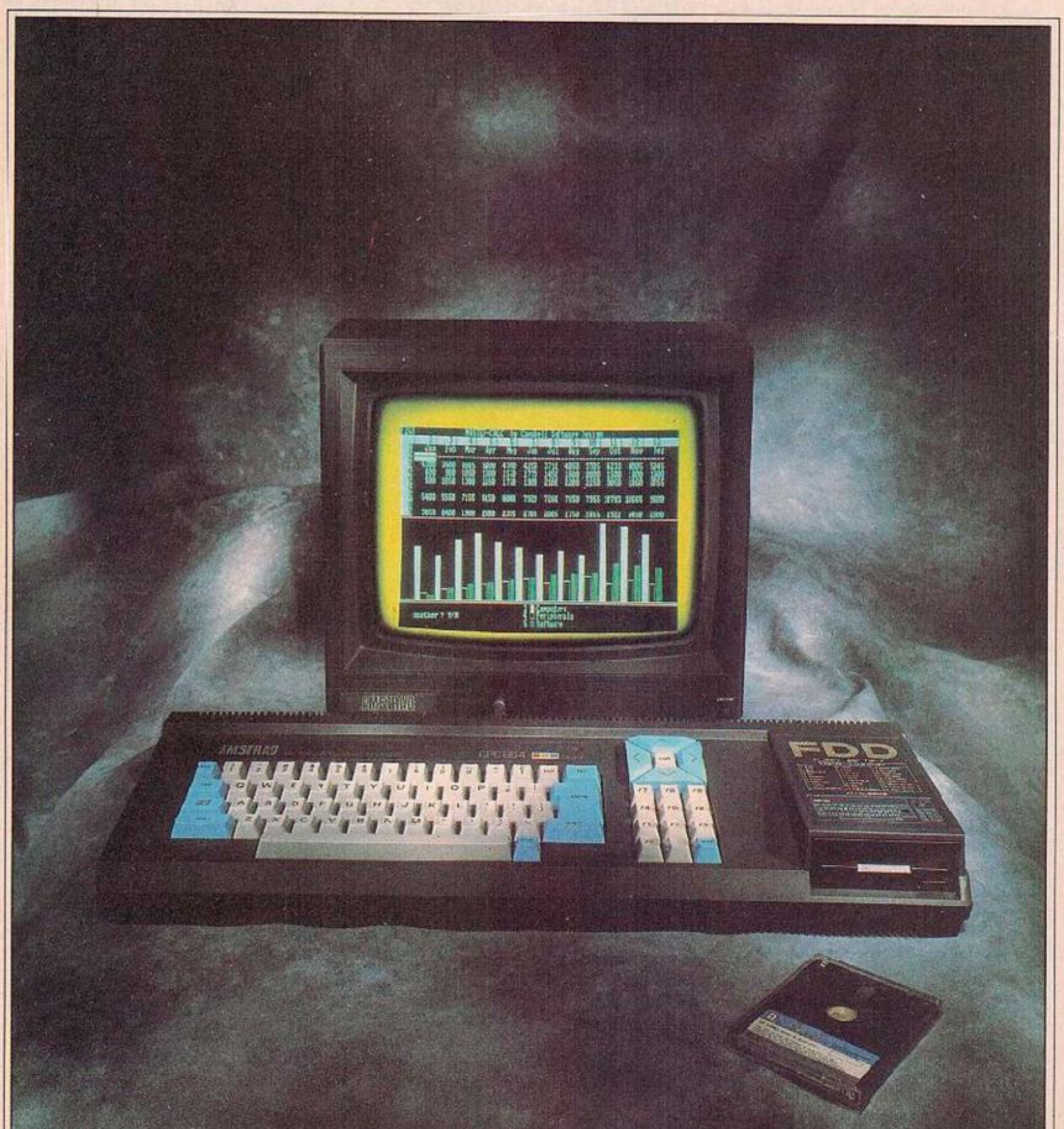
Above: Introducing Geography. Below: ASK's Time Trucker.



Software and Suppliers

Wordwise Plus Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX, BBC micro, £56.35, Rom.
The Viking, Fernleaf Educational Software, Fernleaf House, 31 Old Road West, Gravesend, Kent DA11 0LH. £35.95,
Introducing Geography, BBC Publications, 35 Marylebone High Street, London W1M 4AA, BBC micro, £17.40 disc
Maths with a Story, BBC Publications (see address above), BBC micro, £9.95 cassette
Cars — Maths in Motion, Cambridgeshire Software House, The Town Hall, St Ives, Huntingdon, Cambs. PE17 4AL, BBC micro, £18 cassette and disc
Logotron Logo, Logotron Ltd, 5 Granby Street, Loughborough, Leics. LE11 4DJ, BBC micro, £59 Rom chip.
Atari Logo, Atari UK Ltd
Quest (QuestD), AUCBE, Endymion Road, Hatfield, Herts. AL10 380-Z and 480-Z, £10 disc
Inform, Nottinghamshire Computer Education Centre, Eaton Hall, Retford, Notts. BBC micro, £15 (check) disc
Flowers of Crystal, 4Mation Educational Resources, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ BBC micro and 480-Z(?), £16 cassette £17.65 disc
Dragon World, 4Mation Educational Resources (see address above), BBC micro, RML version in preparation, £16 cassette, £17.65 disc
Merlin's Magical Shop, GSN, Manchester University Press, Oxford Road, Manchester M13 9PL, BBC micro and 480-Z, £25 disc
Osprey, Bourne Educational Software, Bourne House, The Hundred, Romsey, Hants SO5 8BY. £11.95, disc
Surburban Fox, Ginn & Co. Ltd, Prebendal House, Farson's Fee, Aylesbury, Bucks. HP20 2QX. £30
Podd, ASK Ltd, London House, 68 Upper Richmond Road, London SW15 2RP. BBC micro, £9.95 cassette
Time Trucker, ASK Ltd (see address above), Commodore 64, £7.95 cassette
Pazzazz, ASK Ltd, (see address above), Commodore 64 and BBC micro, cassette
Bodyworks, Genesis Productions Ltd, 30 Great Portland Street, London W1N 5AD, Spectrum, £14.95 cassette
Fantastic Voyage, Quicksilva Ltd, Carlton Lodge, 16 Carlton Crescent, Southampton, Hants. SO1 2EJ, Spectrum, £6.95 cassette

· THE NEW AMSTRAD CPC 664 WITH BUILT-IN DISC DRIVE



· AVAILABLE AT BOOTS · COMET · CURRYS · DIXONS · GREENS · JOHN MENZIES · RUMBELOWS

THE LOW COST COMPUTER FOR HOME AND BUSINESS ·



WITH COLOUR MONITOR AROUND

· £449 ·



WITH GREEN SCREEN AROUND

· £339 ·

THE HOME COMPUTER THAT MEANS BUSINESS.

If you know anything about computers you'll know that disc drives are up to fifty times faster than cassette when you're loading and saving programs. In fact, a disc drive makes computing faster, more reliable, more efficient and more fun. But up till now the only way to gain these advantages for a home computer was to buy a separate disc drive attachment. Now Amstrad are pleased to announce the first complete home computer with built-in disc drive: The Amstrad CPC 664.

And when you buy a CPC 664 you'll find it's not just the disc drive that's built-in.

You'll get everything you need, including a monitor (green screen or full colour). We'll even give you a free CPM and Logo disc, so all you do is plug in and you're in business.

BUSINESS OR PLEASURE

Although a disc drive will make games more fun (and there are loads of them to choose from) it also makes the CPC 664 a serious proposition for the business user.

There are accounting, word-processing, spread-sheet and data-base programs (to name but a few).



Amsoft Business Control, is a complete suite of programs for integrated sales invoicing, stock control and sales ledger for around £99. (Requires an additional FD-1 disc drive around £159 and DL-2 cable around £7).

The CPC 664 is also supplied with CP/M* to help make your business more efficient and effective by providing access to the famous range of CP/M* software.

HIGH PERFORMANCE · LOW COST

The one thing you won't need a computer to work out is that the Amstrad CPC 664 represents outstanding value for money.



Wordprocessing with Amsword can improve the productivity of everyone from unskilled typist to trained secretary. Around £23.95.

You only have to check the cost of buying all the elements separately (64K computer, disc-drive, monitor) to realise that the Amstrad package is very hard to beat.

With a green screen monitor the cost is just £339. With a full colour screen it costs £449. And after you've saved money on the price of the computer itself, you go on saving on the price of software.

There are hundreds of programs for business or pleasure available on disc (and cassette) to CPC 664 users. Many from Amsoft, others from other famous-name software houses. Few will cost you more than £49 and most will cost you considerably less.

AN EXPANDING SYSTEM

There is a complete range of peripherals available to CPC 664 users which plug directly into the built-in interfaces.

These include a joystick, additional disc drive (to double your on-line storage) and the Amstrad DMP-1 dot-matrix printer. (There's also a cassette interface so that you can use CPC 464 programs on tape). And there are many more peripherals from Amstrad and other manufacturers which can be used to enhance the CPC 664.

AMSTRAD USER CLUB

Join the optional Amstrad User Club and we'll keep you informed with our monthly user magazine, and information on all software as it is introduced. Your membership details will be recorded on your personal club card, which entitles members to various privileges and offers.



Figure analysis made easy with Microspread. An easy to use spreadsheet with pull-down menus and a wide range of mathematical options. Around £49.



Please send me more information

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Amstrad CPC 664

Amstrad, P.O. Box 462, Brentwood, Essex CM14 4EF

YC/664/4

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SPECTRUM · W.H. SMITH · WIGFALLS · AND GOOD INDEPENDENT COMPUTER STORES ·

INSIDE

Sneak screen shots of the next batch of games from Britain's biggest selling software house. If it's so simple for U.S. Gold to scoop the best of America's games how come no-one else beats them to it?

WITH JUST four full-time staff you could call U.S. Gold a Mickey Mouse company. And now that Geoff Brown has acquired the rights to Walt Disney productions — outbidding multi-billion dollar corporations like British Telecom along the way he just might agree with you.

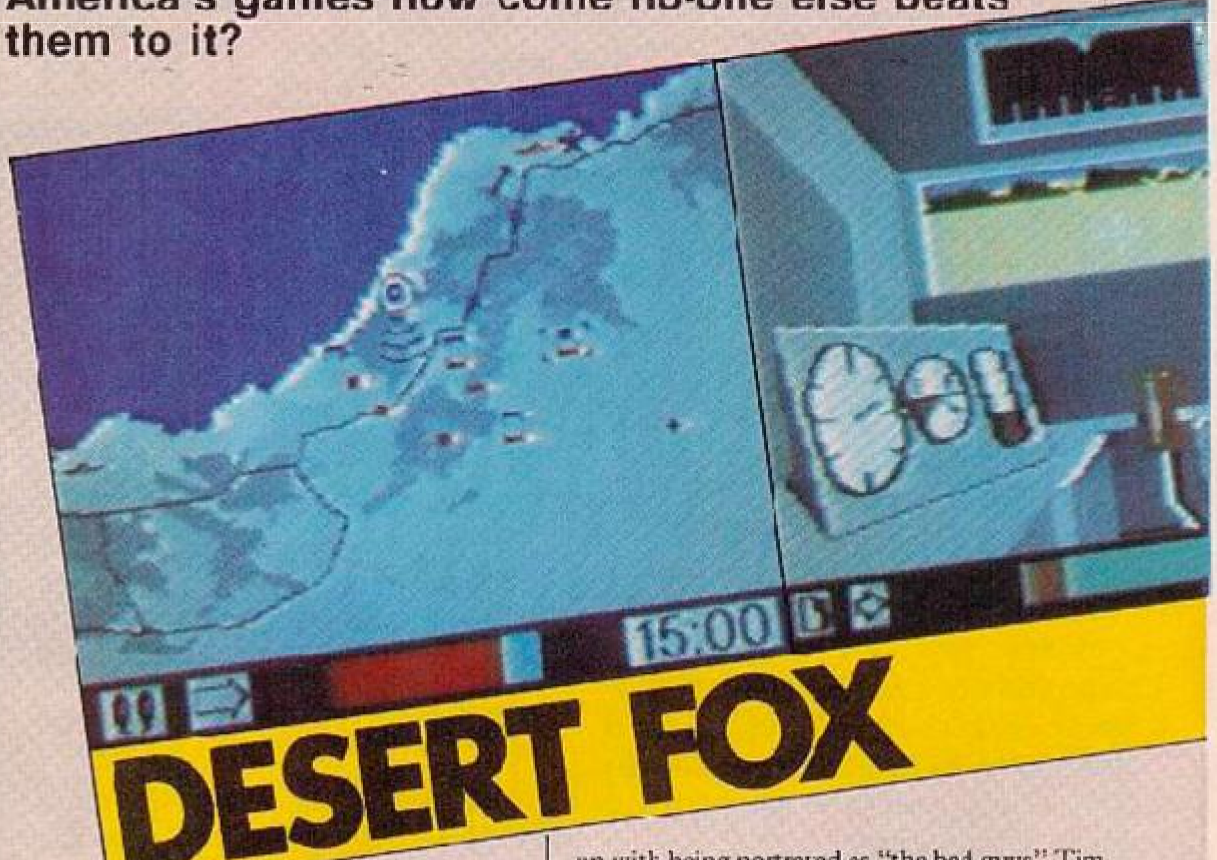
In a year and a half since Geoff and Anne Brown formed U.S. Gold they have launched one title every ten days, selling a million cassettes and taking much the biggest share of the British software market. Even their bitterest critics, and they have many 'they like to knock success" claims Geoff "success breeds jealousy", admit that the invasion of American software has forced up the minimum acceptable standard for programs.

Geoff, a former Maths teacher and mainframe programmer, was running Centresoft importing mainly Atari games from America since 1981, when he realised that there was a wealth of Commodore 64 software over there and every chance that the 64 was going to be the main games machine over here. What was keeping American software out was not its quality but its price.

The Atari 400/800 which Geoff still believes was a "brilliant machine way ahead of its time" never sold well over here because much of the software was only available on disc and usually cost £35 a time. No-one doubted that games like Pole Position and Zaxxon were the best on any micro but people were not prepared to pay high American prices out of low British wages especially when they could buy games for the Spectrum at £5 and £6.

Geoff used his experience of negotiating licensing deals to persuade American houses to let him repackage into cassette format and reprice at around £10 so he could go for the mass market. This was the thinking behind the creation of U.S. Gold in April 1984, then he brought in Ocean to write Spectrum, Amstrad and BBC conversions of the 64 hits.

Companies like Datasoft, Sega, Microprose, Strategic Simulations and Access were all signed up on a first refusal option. Datasoft's strengths were its existing product list including the Atarisoft titles and its ability to sign up films and personalities. Microprose specialised in simulations like F-15 Strike Eagle while Epyx wrote the technically brilliant Impossible Mission which not only won awards but also stayed in the charts for six months. Sega could offer proven hits from its arcade operation such as Spyhunter, and earlier Buck Rogers and Zaxxon.



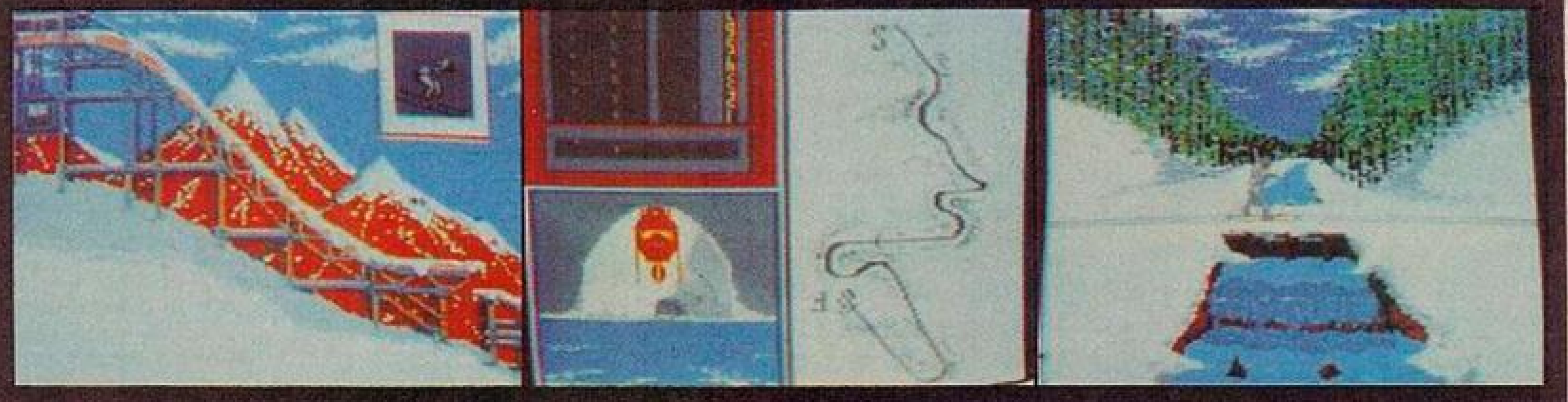
But it was Access that put U.S. Gold on the map with Beachhead and the controversial Raid over Moscow, which ended up being condemned in the House of Commons, not so much for the game itself which was a well written if unimaginative shoot'em-up but for the American originated advertising copy which was so full of cold war cliches that it could have come from the Ronald Reagan Storybook.

At any rate the publicity did no harm to the sales and despite assertions that U.S. Gold is fed up with being portrayed as "the bad guys" Tim Chaney — Geoff's deputy recruited from Commodore early this year reveals in the company's spaghetti western image. "We're like a war machine" he swaggers "we don't have competitors we only have adversaries — we're out to crush them." Nevertheless Geoff and Tim have a high regard for the other top software houses.

Ocean are almost part of the family as is Gremlin Graphics which Tim calls a "boutique-type company" — literally downstairs from U.S. Gold and controlled by the Browns. But Geoff also admires Beyond and Ultimate, "a

WINTER GAMES

With Summer Games II already on the starting blocks US Gold is counting on Epyx's Winter Games to bring in the bread after Christmas. Summer Games I was eclipsed by Daley Thompson's Decathlon but since then Epyx has made its mark with Impossible Mission. Winter Games again uses a decathlon approach where you have to compete in a series of disciplines such as the ski jump and cross country skiing.



U.S. GOLD



From the team that wrote Dambusters, Sydney Development, comes Desert Fox. This time you are Buzz Baxter taking on the Afrika Korps single handed, not so much a careful simulation like Dambusters — Buzz drives a "Turbo" Sherman tank — but better graphics and more playable, a glorified shoot-em-up with a bit of strategy as you take on Tiger tanks and Stukas.

fantastic company but they're in a different part of the market — they concentrate on arcade adventures" and keeps an eye on the sleepers — middle-ranking software houses with big corporations behind them — like Robert Maxwell's Mirrorsoft and British Telecom's Firebird.

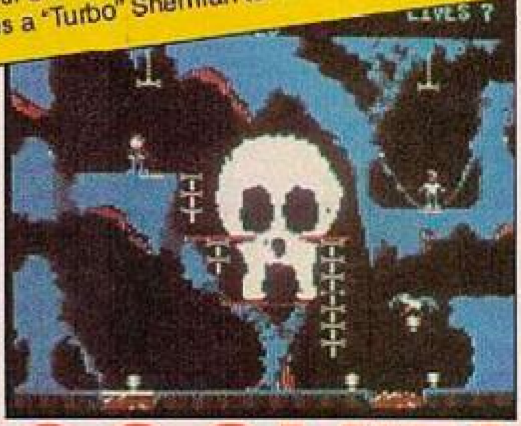
When he is wearing his Centresoft hat Geoff tries out most of the games that he plans to distribute to see if they are up to scratch "although I don't look at a new Ultimate game — I take it". He is remarkably free with his praise for other houses' games — both he and Tim feel that Boulderdash was great — should have been a number one hit, and still relish old favourites like International Soccer and Matchpoint.

Naturally Geoff still hankers after old Atari classics and Tim prefers the Commodore 64. He believes that programmers have stretched the capabilities of the 64 to the limit now "but you can still get new tunes from an old violin".

They can appreciate the technical skill involved in a well-written Spectrum game but they don't use the machine for games playing themselves — whereas hits from the States can turn them back into addicts. "We stayed up till two in the morning when Aztec Challenge arrived to try to finish it". When Tim enthuses about Dropzone as being "like going into a china shop and smashing everything" and scans around the room you worry for a moment in case the elegant Scandinavian reading light is about to find out the risks of living on a war machine's desk.

Critics have suggested that U.S. Gold pays

(continued on page 59)

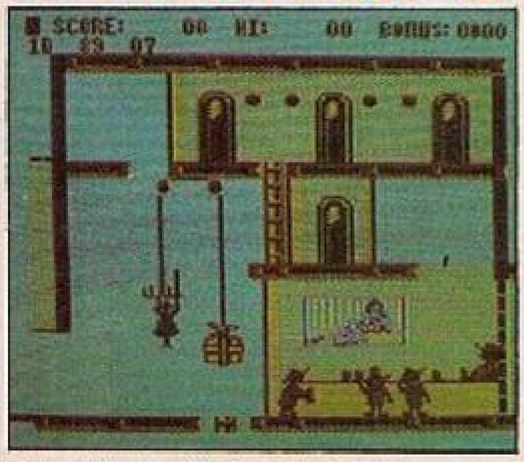


GOONIES



Goonies may look like an ordinary platform game to you but based on Spielberg's latest blockbuster, Geoff Brown hopes it will be this year's Ghostbusters.

ZORRO



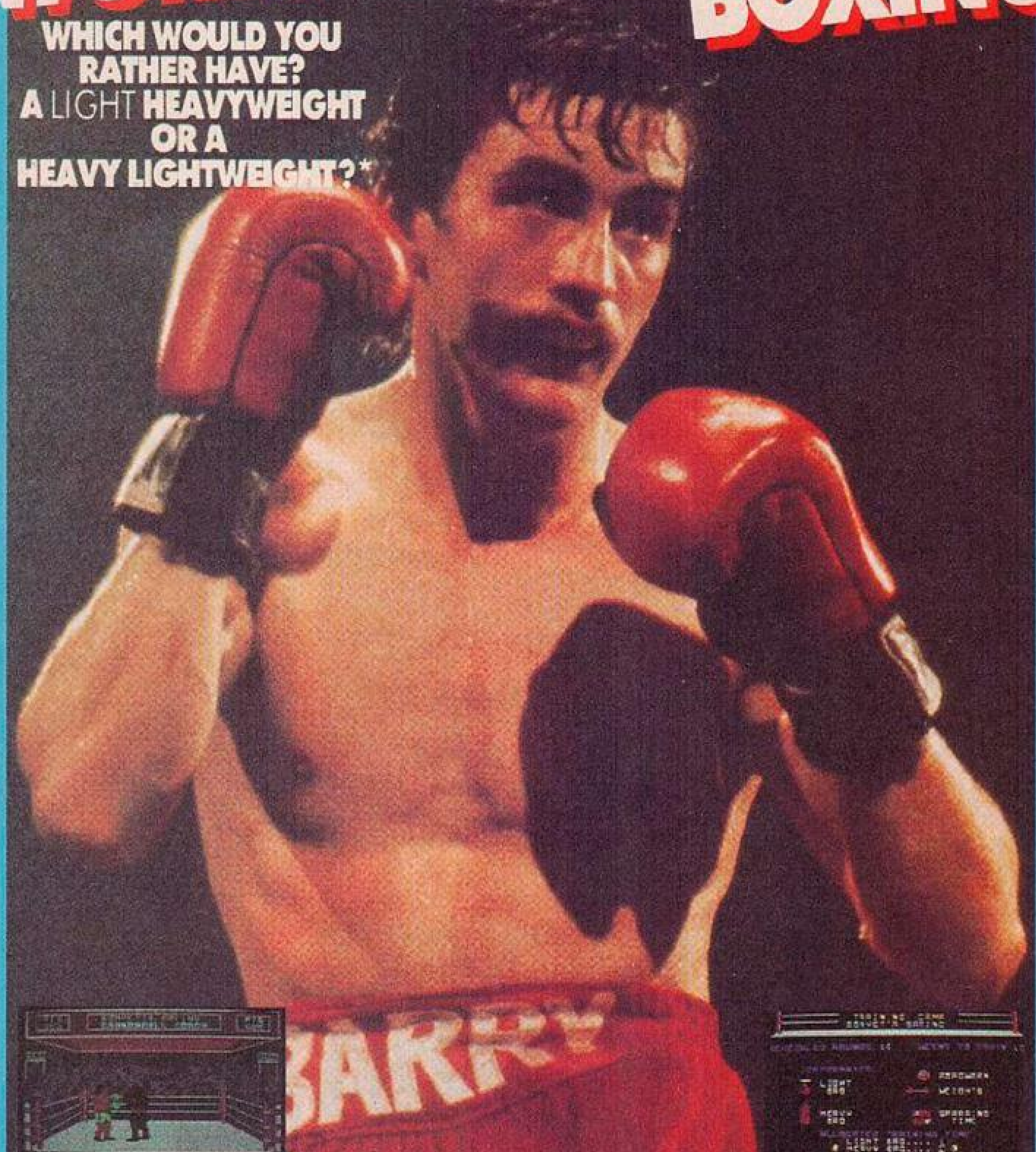
Zorro lets you swashbuckle like Douglas Fairbanks Senior. As champion of the common people you swordfight your way across screen after screen of oppressors.



Alternative Reality is a quirky mixed text and graphics adventure with a slightly hippy feel — well it does come from Paradise Programming — as you steer your way through a three-dimensional maze to the Betelguese sales. Philip Price wrote the game with excellent music from Gary Gilbertson.

ALTERNATIVE REALITY

BARRY McGUIGAN WORLD CHAMPIONSHIP BOXING



Barry Mcguigan World Championship Boxing. The first computer boxing game to give you 'real-life' action with all the style and strategy of the big fight.

Round One. You're up against 19 top boxers including, the champ himself, Barry Mcguigan. You'd better box clever to beat these boys.

Round Two. You're aiming for the title. Time to create your very own boxing partner. You decide how he looks, how he fights. You put him through his paces to build up stamina and endurance.

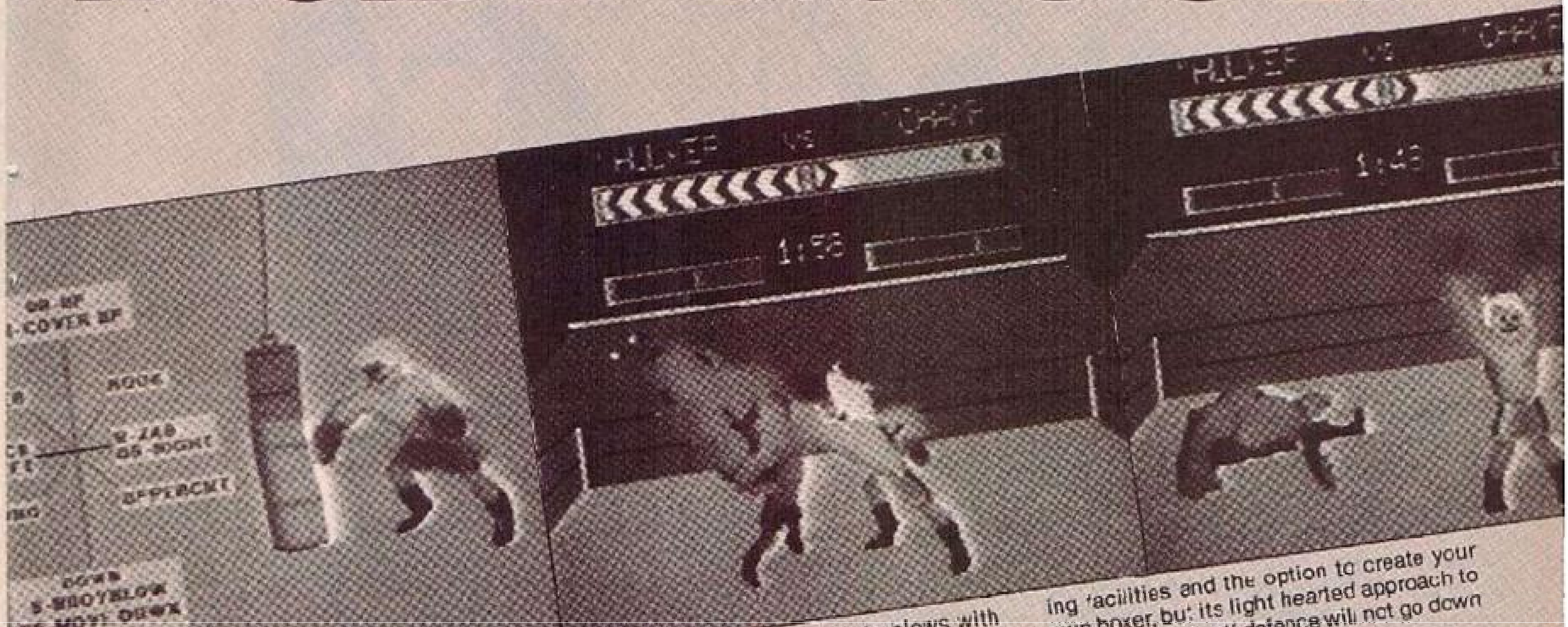
Round Three. What a fight! What a champ! It's a knock-out!

*We know he is the best featherweight,but we thought it was a good line.

Sport
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INSIDE U.S. GOLD



BOXING

Geoff and Tim are coming to blows with the boys downstairs at Gremlin. Championship Boxing scores over Gremlin's Rocco and Elite's Frank Bruno on graphics and has training facilities and the option to create your own boxer, but its light hearted approach to the noble art of self defence will not go down well on the Old Kent Road.

(continued from page 57)

the Americans too high a price for the rights to their software but Geoff points out that money up front is only part of the business — otherwise the likes of CBS could have simply bought success with its superior financial resources. Geoff uses a network of talent spotters in the U.S.A. so he can concentrate resources on suitable programs. Given Gold's track record on promoting and selling he can offer a relatively accurate forecast of what a program should sell. Sliding scale payments safeguard against dollar/pound exchange rate fluctuations.

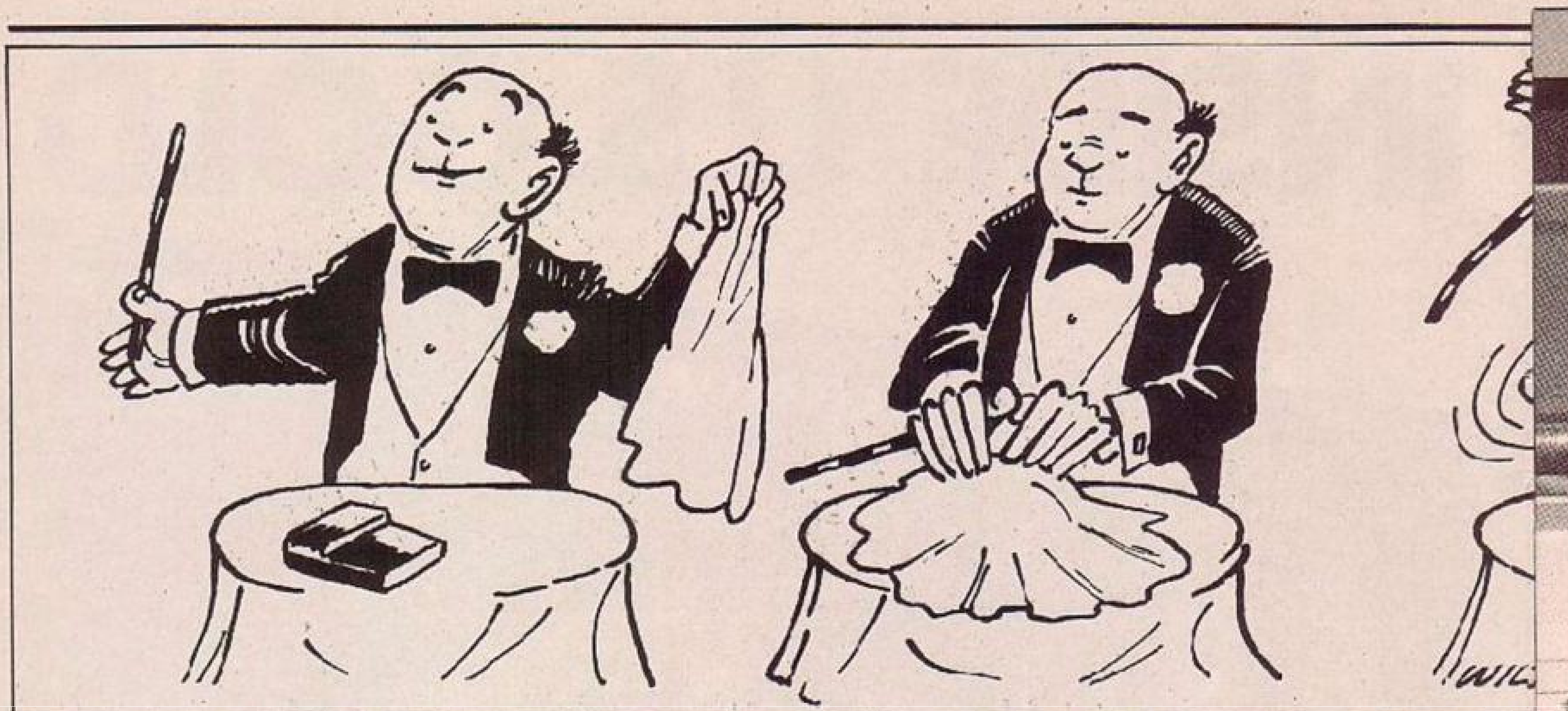


Geoff often buys the rights to programs from houses with a proven record when they are little more than ideas. Sydney Development Corporation, the Canadian — oddly enough — programmers who wrote Dambusters only had to show a game plan for Geoff to sign up Dambusters II. In the meantime, Sydney's Desert Fox is ready for launch.

Geoff's personal preference for shoot-'em-ups has not blinded him to the growing market for simulations, and Microprose run by gung ho Bill Stealey. "I'm selling these games to men. If you haven't got the right stuff I don't want to know" is his trump card. Already F-15 Strike Eagle, Nato Commander, Solo Flight and Kennedy Approach have made their mark. Now Crusade in Europe and Decision in the Desert are on their way under U.S. Gold's new Transatlantic Simulations label, with a hefty £20 price tag.

But sequels and conversions are the name of the game at the moment. After Beachhead II "blood and guts on a computer" comes Pole Position II, and Summer Games II. U.S. Gold should keep its tape duplicators, Ablex in Telford, running flat out over the next few months and there are plans for merchandising deals in other areas "why not Zaxxon soap?" he asks, but Geoff is not complacent. "There is no divine right of U.S. Gold to be successful. There is no masterplan, we were successful by accident with hard work and a few gambles. It's pressure — but it's better than working down a coalmine".

When companies produce a game that flops he believes they should "send them to the crusher" rather than sell them off cheap — and he thinks that if and when U.S. Gold makes a serious error the press will suggest he deserves a similar fate — "look at Clive Sinclair, all that he's done for the industry, the moment he makes a mistake the headlines are 'IDIOT', 'FINISHED'. I get tired of being knocked."



ONE OF the main restrictions of the Sinclair Microdrive system is that it is only possible to access data files from Basic which imposes a severe restriction on database and other similar applications which access data files. For example, changing a record in a data file involves opening a new file, copying the preceding records from the old to the new, writing the altered record to the new file, copying the rest of the old file, deleting the original file and renaming the new file as the old file.

Even this last is not straightforward as Sinclair Basic lacks a Rename command. In practice, the following code illustrates the type of subroutine that would be required to alter the nth record of a file of 100 records called "data" in which each record is 24 bytes long. The new nth record is in the string n$.

```
9000REM Alter a record (Sinclai
r BASIC)
9010OPEN#5;"m";1;"data"
9020OPEN#6;"m";1:"new.data"
9030IF n=1 THEN GOTO 9070
9040FOR n=1 TO n-1
9050INPUT#5; LINE x$ : PRINT#6;
x$
9060NEXT p
9070INPUT#5; LINE x$ : PRINT#6;
n$ : REM wrte new record
9080IF n=100 THEN GOTO 9120
9090FOR p=n+1 TO 100
9100INPUT#5; LINE x$ : PRINT#6;
x$
9110NEXT p
9120CLOSE#5 : CLOSE#6
9130ERASE "m";1;"data"
9140MOVE  "m";1;"new.data" TO "
m";1;"data"
9150ERASE "m";1;"new.data"
9160RETURN
```

It should be clear that this is both tortuous and very slow as it involves many operations of the microdrive which also causes increased wear and tear on the cartridge and drive. MIRA solves these problems by providing Sinclair Basic with three new commands which together allow the maintenance of random access files similar to those available on micros such as the BBC with disc interface.

The new commands (RND #, Point #, Restore #) are all obtained by using existing Sinclair keywords but in new contexts. The use and syntax of the new commands and the theory behind their implementation are explained below but first, as an example, the above subroutine re-written using the MIRA commands.

Note that a 24 byte record occupies 25 bytes in the file because of the inclusion of a carriage return (CHR$ 13).

```
9000REM Alter a Record (MIRA)
9010OPEN#5;"m";1;"data" : RND#5
9020POINT#5,25*(n-1) : PRINT#5;
n$
9030RESTORE#5
9040RETURN
```

The first of the new commands, RND followed by a stream of identifier (e.g.: #5) causes the file attached to the given stream to be declared as a random access file. The file must already have been opened with the standard Open # command and must be a "read" file.

The RND command cannot be used to create or open a file. In the example above, the file "data" would originally need to have been set up with code such as:

```
100DIM x$(24)
110OPEN#5;"m";1;"data"
120FOR p=1 TO 100 : PRINT#5;x$
:NEXT p
130CLOSE#5
```

Point followed by a steam identifier and a numeric expression separated by a comma (e.g. Point # 5, n) moves the internal pointer of the file attached to the given stream to the n th byte of the file, where the next Input #, Print #, or Inkey$ # will take place, provided that the file has been opened with Open # and made random with RND #.

An error will be generated if you try to move the pointer outside the limits of the file. The Basic loader program for MIRA — listing 1 — also defines a function, FN p(x), which returns the current value of the internal pointer of the file attached to stream x — e.g. LET pos=FN p(5). For what it's worth, this will work with any "read" file, not just a random access one.

Restore followed by a stream identifier (e.g. # 5) closes the random access file attached to the given stream. Restore # must be used in preference to Close # to correctly close a file that

Figure 1. Microdrive channel structure.

Byte	Length	Description
0	2	"output" routine
2	2	"input" routine
4	1	channel specifier "M"
5	2	shadow Rom output
7	2	shadow Rom input
9	2	length of this Chans area (595)
11	2	current buffer position (0-512)
13	1	position of record in file (0-255)
14	10	10 bytes of filename
24	1	bit 0—reset—"read" file set—"write" file bits 1-7—unused (all reset)
25	1	drive number (1-8)
2	2	drive map location
28	12	12 bytes of header pre-amble
40	1	bit 0—set to signal header bits 1-7—unused
41	1	sector number (0-255)
42	2	unused (see text)
44	10	10 bytes of cartridge name
54	1	header checksum
5	12	12 bytes of data pre-amble
67	1	bit 0—reset—not a header bit 1—reset—not end of file set—end of file bit 2—reset—a Print file set—not a Print file bits 3-7 unused (all reset)
68	1	record number (0-255)
69	2	number of bytes in record (0-512)
71	10	10 bytes of filename
81	1	checksum
82	5'2	buffer data
594	1	data checksum



MIRA

Mike Rains gives your Microdrive a random access facility.

has been marked as random with RND#, but may not be used to close any other type of file.

The theory of adding new commands to Sinclair extended Basic (i.e.: with Interface 1 attached) is fully described by A Pennell, *Master Your ZX Microdrive* (Sunshine 1983) and I Logan, *Spectrum Microdrive Book* (Melbourne House 1983). In short, the shadow system variable Vector (address 23735), which usually contains the address of the Rom error handling routine, must be loaded withe address of the new commands routine which must then perform two distinct functions.

First, it must check the syntax of the new commands and cause an error if it is incorrect, and them, at run-time only, execute the command. "Run-time" means during the running of a program or during the execution of a direct command. Lines 9030-40 of the MIRA Basic loader program alter the value of Vector (lines 9030 first ensures that the shadow system variables have been created).

As well as providing the new commands as described above, MIRA must also provide new routines to replace the standard Print and Input commands. To demonstrate how this is done and to explain the actual operation of the new commands it is necessary to first describe the structure of a Microdrive channel.

Each Microdrive channel takes up 595 bytes in the area of memory reserved for channel information. The start of this area is contained in the system variable Chans (address 23631). The actual location of a particular channel is found by adding the displacement contained in the relevant Streams system variable — two bytes for each of streams −3 to 14 starting at address 23568 — to the value in Chans and subtracting 1. FN c(x) defined in the Basic loader program performs this function for stream x. The byte allocation within a Microdrive channel is shown in figure 1 and should be referred to during the following discussion of the operation of the various MIRA routines.

The RND# command run-time routine performs three actions:

- Bit 0 of byte 24 in the relevant channel is set to signify a "write" file.
- The addresses of the new output and input routines are loaded into bytes 5-6

Listing 2.

```
9000 REM **MIRA Initialization**
9010 CLEAR 62999: LOAD *"m";1;"c:mira"CODE 63000
9020 CLOSE #0: LET org=63001: LET h=INT (org/256): LET
 l=org-256*h
9030 POKE 23735,l: POKE 23736,h: REM Both must be in o
ne line.
9040 DEF FN c(x)=PEEK 23631+256*PEEK 23632+PEEK (23574
+x*2)+256*PEEK (23575+x*2)-1
9050 DEF FN p(x)=512*PEEK (FN c(x)+13)-256*PEEK (FN c(
x)+12)+PEEK (FN c(x)+11)
9060 CLS : PRINT #0;AT 0,0;"MIRA (1.0) - (c) Mike Rain
s 1985": PAUSE 0
```

and 7-8 of the channel.

- Bit 0 of the unused 42nd byte of the channel is used as a flag to signal whether the buffer contents have been altered. RND# resets this bit to signify "unaltered".

The following actions are performed by the Point# command:

- The record number in which the desired file position lies is calculated and compared with the value in byte 13 of the channel.
- If they do not match, the "write buffer" and "read buffer" sub-routines are called to fetch the required record into the buffer.
- The desired position within the record is loaded into channel locations 11 and 12.

The Restore# calls the "write buffer" sub-routine to write the current record if it is flagged as "altered" (i.e.: bit 0 of byte 42 set), resets bit 0 of channel byte 24 to flag the file as "read" and then calls the shadow Rom Close# routine.

The new output routine used by all Print# statements is entered with the character to be written to the file in the A register. The following actions are performed:

- The current buffer position is obtained from bytes 11 and 12 of the channel, added to 82 — the start of the data area — to give the correct address, and the character from the A register stored there.
- The buffer position is incremented and re-stored in bytes 11 and 12.
- The record is flagged as "altered" by setting bit 0 of byte 42.
- The "next record" sub-routine is called if the end of the present record has been reached.

The new input routine used by Input# and Inkey$# statements performs the following actions:

- Tests for the end of the current record and calls "next record" if required.
- Increments the buffer position in bytes 11 and 12 of the channel.
- Using this position — added to 82 as before — reads a character from the buffer into the A register and sets the carry flag to signal a successful read.

MIRA can be entered into your Spectrum in the following way:

- The Basic loader program — listing 1 — will Poke the machine code from the Data statements into memory and then initialise MIRA.

Once the MIRA code has been entered it may be saved to Microdrive with the command

SAVE *"m";1;"c:mira" CODE 63000,410

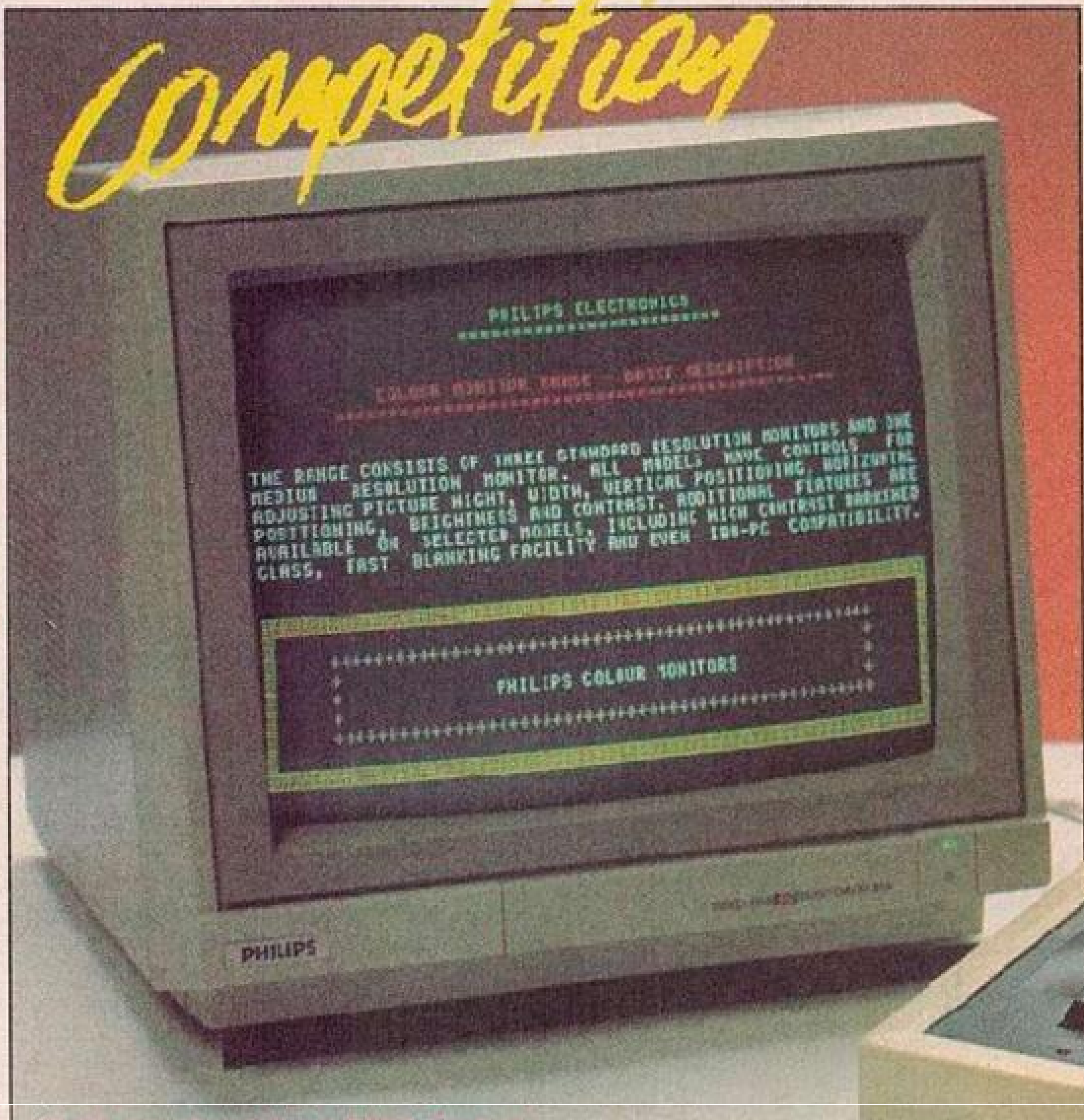
Listing 2 may then be used to load the code and initialise MIRA. If you have relocated the code you will need to change the Clear address in line 9010 and the value of "org" in line 9020. Note that MIRA will need to be re-activated by the use of lines 9020-60 of listing 2 following a New command. ■

Listing 1.

```
  1 REM ************************
  2 REM **MIRA (BASIC LOADER)**
  3 REM **(c) Mike Rains 1985**
  3 REM ************************
  4 REM ************************
  5:
  6 CLS : PRINT "             STOP TAPE"''"
MIRA (1.0)"'''Please note that although it is supplie
d on cassette, this      program will only operate wit
h  Interface 1 attached and is    entirely concerned
with micro-   drive operations"'' "    Press any key to c
ontinue": PAUSE 0
  8:
 10 DATA 1254,062,215,024,000,254,165,040,011,254,227
 11 DATA 1283,040,069,254,169,040,050,195,240,001,215
 12 DATA 1061,032,000,254,255,032,246,215,032,000,215
 13 DATA 1648,130,028,205,183,005,205,222,240,221,203
 14 DATA 0791,024,070,040,003,195,002,009,221,116,004
 15 DATA 1165,198,033,001,247,221,117,005,221,116,006
 16 DATA 1231,033,040,247,221,117,007,221,116,008,221
 17 DATA 1272,203,043,134,195,193,005,024,044,195,240
 18 DATA 1062,001,215,032,000,254,033,032,244,215,032
 19 DATA 1434,000,215,130,028,205,183,005,205,222,246
 20 DATA 1814,217,229,217,205,117,247,221,203,024,134
 21 DATA 1639,205,165,018,217,225,217,195,193,005,195
 22 DATA 1278,248,001,215,032,000,254,035,032,246,215
 23 DATA 0976,032,000,215,130,028,254,044,040,002,231
 24 DATA 1013,000,215,032,000,215,130,028,205,183,005
 25 DATA 1087,215,162,045,197,205,222,246,225,167,203
 26 DATA 0619,000,075,038,000,040,001,036,221,126,013
 27 DATA 1610,165,042,013,217,229,217,229,197,205,117
 28 DATA 1815,247,225,205,154,247,205,221,117,011,221
 29 DATA 1543,116,012,217,225,217,192,193,005,215,140
 30 DATA 0500,030,135,079,006,000,033,027,092,009,094
 31 DATA 1609,035,086,213,225,229,237,106,221,225,032
 32 DATA 1840,003,195,079,006,237,091,075,092,221,025
 33 DATA 1491,221,043,201,221,033,248,255,221,025,221
 34 DATA 1341,094,011,221,086,012,221,229,221,025,221
 35 DATA 1348,119,002,221,225,019,221,115,011,221,114
 36 DATA 1453,012,221,203,042,198,203,074,208,205,095
 37 DATA 1409,247,201,221,042,081,092,033,058,243,195
 38 DATA 1177,109,012,221,094,011,221,086,012,221,110
 39 DATA 1114,069,221,102,070,055,237,082,040,009,221
 40 DATA 1716,229,205,095,247,221,225,024,130,019,221
 41 DATA 1194,115,011,221,114,012,027,221,229,221,035
 42 DATA 1794,221,126,007,221,225,055,201,217,229,217
 43 DATA 1493,205,117,247,033,205,154,247,042,000,221
 44 DATA 1382,119,011,221,119,012,217,225,217,201,030
 45 DATA 1147,000,221,110,013,229,221,203,042,070,040
 46 DATA 1460,023,221,126,022,205,247,023,251,221,126
 47 DATA 1063,041,221,119,013,205,145,026,251,062,000
 48 DATA 1700,205,247,023,251,229,201,221,117,013,205
 49 DATA 1389,023,026,251,062,000,205,247,023,251,221
 50 DATA 0580,203,042,134,201,000,000,000,000,000,000
 60 DATA 54858
 90:
100 CLEAR 62999: LET e$=0: RESTORE 10: POKE 23692,255
110 LET tt=0: FOR p=0 TO 40: READ ch: LET t=0: FOR q=
0 TO 9
120 READ a: LET t=t+a: POKE 63000+10*p+q,a: NEXT q
130 LET tt=tt+ch: IF t<>ch THEN BEEP .2,30: PRINT ''"E
rror in line "(p+10): LET e$=1: GO TO 150
140 PRINT p+10;"   ";
150 NEXT p: READ at: IF at<>tt THEN BEEP .2,30: PRINT
''"Error in checksums": LET e$=1
160 IF e$ THEN BEEP .2,50: PRINT ''"Correct errors and
 re-run": STOP
170 PRINT ''"All data OK - Initialising MIRA": PAUSE
100
180:
9000 REM *MIRA INITIALIZATION*
9030 CLOSE #0: LET org=63001: LET h=INT (org/256): LET
 l=org-256*h
9040 POKE 23735,l: POKE 23736,h: REM Both must be in o
ne line
9050 DEF FN c(x)=PEEK 23631+256*PEEK 23632+PEEK (23574
+x*2)+256*PEEK (23575+x*2)-1
9060 DEF FN p(x)=512*PEEK (FN c(x)+13)+PEEK (FN c(x)+1
1)+256*PEEK (FN c(x)+12)
9070 PRINT ''"Save Machine Code to Microdrive?Yes/No "
: PAUSE 0: LET a$=INKEY$: IF a$="y" OR a$="Y" THEN PR
INT "YES": SAVE *"m";1;"c:mira"CODE 63000,410: PRINT '
"Machine Code saved as ""c:mira""": PAUSE 150
9090 CLS : PRINT #0;AT 0,0;"MIRA (1.0) - (c) Mike Rain
s 1985": PAUSE 0
```

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- The name of the winner will be printed in the December issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in September 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Business Press International or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
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PHILIPS COMPETITION

Don't forget to enclose this coupon, or a photocopy of it, when you send in your entry to Philips Competition, *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Study the list below and mark in order of priority the key features of the new Philips colour monitors.

Dedicated for computer use ☐

Outstanding text and graphic displays ☐

Adjustable stands ☐

Low-reflection treated glass ☐

Choice of composite video and RGB inputs ☐

Compatibility with leading computers ☐

I would like a dedicated Philips monitor because ____________

____

____

Name ____________

Address ____________

____

MAD CAVE



PIXEL BY PIXEL movement, sound, 10 different screens and interrupt-driven animation are some of the features that make this commercial quality game so compulsive.

The object of the game is to guide a spacecraft around the cavern collecting fuel canisters while avoiding aliens. When you've picked up all the fuel you can exit to the next level. To complicate matters your ship tends to drift as soon as you take your fingers off the keys.

At times it may appear to be propelled by a death wish, but in fact it is simply being true to the laws of zero-G physics. The control keys are as follows:

QWERTYUIOP — up
ASDFGHJKL — down
ZCBM — right
XVN — left

Caps and Space together quits the game; pressing 1 will pause it, and any key restarts.

To enter the game first save listing 1 at the front of your games tape. Then type in the hex loader in listing 2 and save it elsewhere. Now use it to enter the hex code for the game itself from listing 3. Once you have typed it all in save it after listing 1 with:

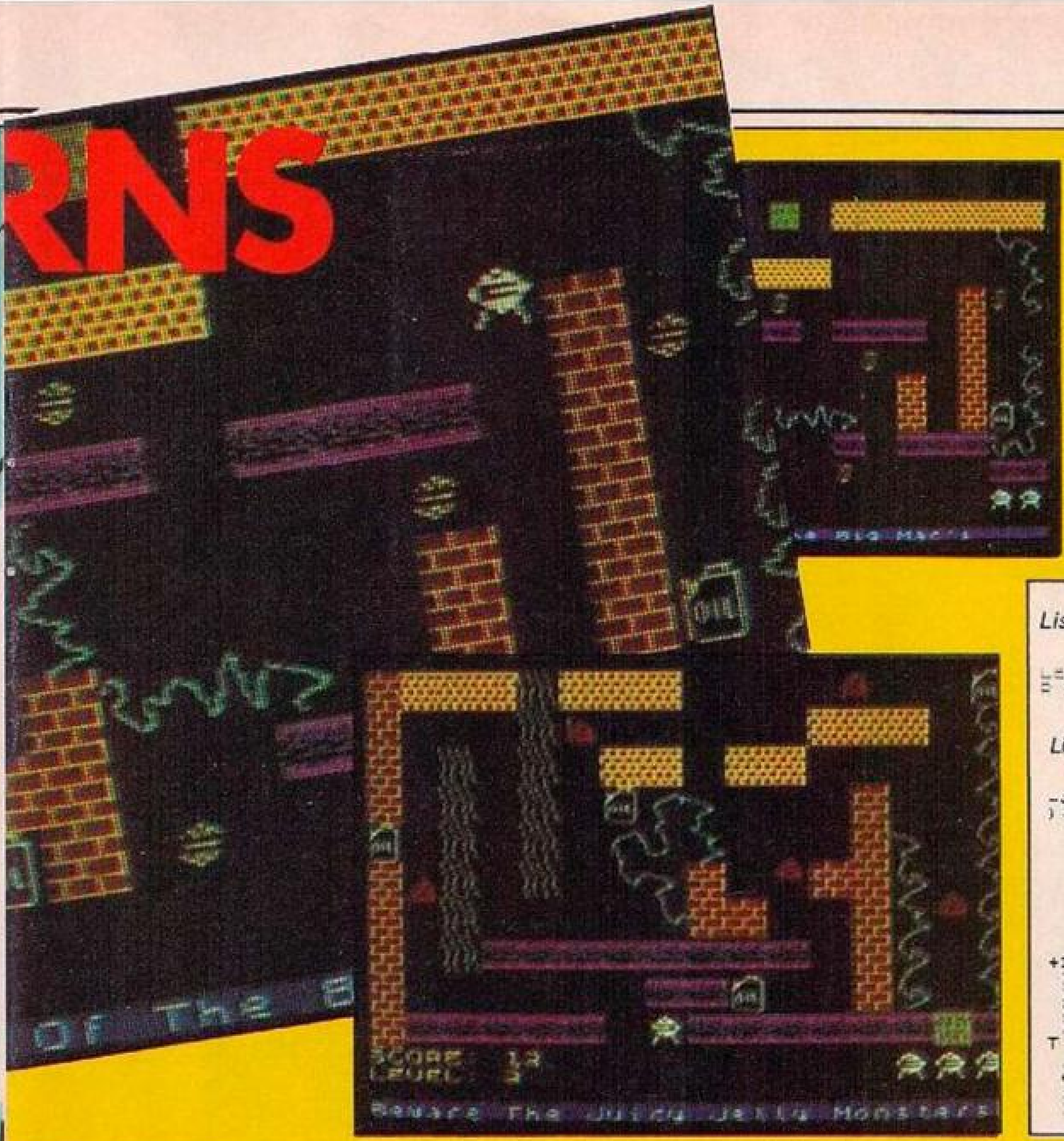
SAVE "M.Caverns" CODE 34240,6800

If you can't face the effort of entering over 6K of machine code the program is available on tape for £2.00 from Karl Jeffery, 27 Testcombe Road, Alverstoke, Gosport, Hampshire PO12 2EL.

Listing 3.

```
[illegible]
```

RNS





This program is available on Telsoft.

Listing 1.

```
   1 BORDER 0: PAPER 0: INK 0: C
LEAR 36000: LOAD ""CODE : RUN US
R 39150
```

Listing 2.

```
  10 DEF FN h(h$)=16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2
)-48-(7 AND h$(2)>"9")
  20 INPUT "Start: ";s
  30 INPUT "Finish ";f
  40 FOR n=s TO f STEP 8
  50 LET tot=0: PRINT n;": ";
  60 INPUT h$: PRINT h$;
  70 LET x=0
  80 FOR b=1 TO LEN h$ STEP 2
  90 LET z=FN h(h$): LET tot=tot
+z
 100 POKE n+x,z
 110 LET h$=h$(3 TO ): LET x=x+1
 120 NEXT b
 130 PRINT " = ";: INPUT t: PRIN
T t
 140 IF tot<>t THEN PRINT "input
 error - try again": GO TO 50
 150 NEXT n
 160 REM enter STOP to stop
```

```
36328: 0006060606060606 = 40
36336: 0500000000000500 = 26
36344: 0300000000000E10 = 30
36352: 0500002000000305 = 32
36360: 0500000000000005 = 21
36368: 0A00000000000000 = 22
36376: 000000000000000C = 20
36384: 0512000111111111 = 106
36392: 0011111100000000 = 69
36400: 0500000000000000 = 17
36408: 0500000000000000 = 20
36416: 0505050500000600 = 21
36424: 0300000000050000 = 22
36432: 0520000000000003 = 28
36440: 0F10000000001208 = 71
36448: 0500000500000500 = 27
36456: 0011000111110900 = 90
36464: 0500000000012000 = 31
36472: 0000000000012111 = 54
36480: 003F00EC4F400001 = 628
36488: 13503FA20A001800 = 497
36496: 7F70FF0C1401F500 = 841
36504: FF3018421F200001 = 407
36512: 18205FA200011800 = 401
36520: 0000000000000000 = 0
36528: 0000000000000000 = 0
36536: 0000000000000000 = 0
36544: 4255776172652051 = 711
36552: 65652041747564F7 = 759
36560: 201A6562C5072820 = 653
36568: 6F5E737465727320 = 814
36576: 0606060606050606 = 49
36584: 0000000000000012 = 18
36592: 0000000000700000 = 20
36600: 0000000005060000 = 30
36608: 0800005000500605 = 30
36616: 0005050000000005 = 23
36624: 080000500050120F = 51
36632: 100000000060000B = 35
36640: 1200005000050F0D = 56
36648: 050000000061000C = 47
36656: 0820050205000E10 = 48
36664: 0820000010300005 = 47
36672: 050005020000000E = 27
36680: 082000020080000C = 47
36688: 0500005111111111 = 98
36696: 111121000080000C = 83
36704: 0500000000000011 = 23
36712: 111200000600000E = 66
36720: 0511111111110000 = 93
36728: 1111111111110711 = 126
36736: 701F08102F3800FE = 634
36744: 1050AFE020011C40 = 458
36752: 4F30000110E0AF30 = 603
36760: FE3010E09F7000FF = 1032
36768: 10509F7200FF1000 = 806
36776: 0000000000000000 = 0
36784: 0000000000000000 = 0
36792: 0000000000000000 = 0
36800: 4965766173696F6E = 809
36808: 204F66206F646552 = 866
36816: 55506E672065626C = 826
36824: 20546861626E7320 = 888
36832: 0500000050000012 = 28
36840: 0807000000000000 = 15
36848: 0500000111003505 = 26
36856: 05030A0905060500 = 54
36864: 0500000500000000 = 10
36872: 0500000000000000 = 5
36880: 0500000011111100 = 71
36888: 0500000000062500 = 25
36896: 1200000500002000 = 23
36904: 0300100000052000 = 41
36912: 0500001111110008 = 64
36920: 050006060606C600 = 43
36928: 0500000050000000 = 18
36936: 05050E100051A000 = 75
36944: 0500001111100806 = 56
36952: 090F090C000E0A10 = 67
36960: 0F00000000000000 = 15
36968: 0000000000001200 = 30
36976: 0511111111111111 = 124
36984: 0000000001111111 = 66
36992: 20AF0510AF5000FF = 707
37000: 20223F2850022030 = 249
37008: 2FE20100200C2F20 = 447
37016: FD0216F0AF5000FF = 1043
37024: 20426F0001001000 = 254
37032: 0000000000000000 = 0
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37048: 0000000000000000 = 0
37056: 20426F6D65201F66 = 603
37064: 2074686520506147 = [illegible]
37072: [illegible] = 848
37080: 20546F6772202020 = 557
37088: 0700000000000000 = 7
37096: 0200000000000500 = 5
37104: 1111111111111100 = 119
37112: 0211111111050500 = 78
37120: 1200000000000000 = 18
37128: 0200000000000500 = 5
37136: 02000000000F0A10 = 60
37144: 0200050006120500 = 43
37152: 050A05000A050000 = 65
37160: 0000000000051200 = 23
37168: 0000000000000005 = 5
37176: 0200080002080800 = 14
37184: 0200000000000805 = 24
37192: 0200000000050502 = 12
37200: 0000000000080805 = 32
37208: 0000000000050502 = 12
37216: 0000000000000120 = 26
37224: 0800000000000000 = 8
37232: 0503050D06050600 = 50
37240: 0505050505050500 = 44
37248: F0AF0AF03F4000FE = 1136
37256: 2410AF6002001C60 = 449
37264: 0F10FF0024C03F40 = 913
37272: FF0021102F400100 = 419
37280: 21509F6000FF2400 = 710
37288: 0000000000000000 = 0
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37304: 0000000000000000 = 0
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37320: 204F662054686520 = 566
37328: 4A75696379204A65 = 788
37336: 416C6965645E7320 = 686
37344: 0000000000000000 = 0
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37376: 0820000000000500 = 16
37384: 0025120000050000 = 34
37392: 0820000000120500 = 42
37400: 0025050000812000 = 50
37408: 0820000000050500 = 32
37416: 0025050000505000 = 40
37424: 0020000512000500 = 42
37432: 0025050000050008 = 32
37440: 0820050805000500 = 40
37448: 0025080000505000 = 40
37456: 0820000508200500 = 40
37464: 002A0A0A000A0508 = 40
37472: 0820002080000500 = 40
37480: 0025000800050008 = 40
37488: 0812080812050500 = 75
37496: 0027081203051203 = 78
37504: F0AF0C0F0AF100FF = 1203
37512: 28E09F3800FF2870 = 837
37520: 1F40000248629F28 = [illegible]
37528: 00FD20402F2100FE = [illegible]
37536: 2810AF7000004000 = [illegible]
37544: 0000000000000000 = 0
37552: 0000000000000000 = 0
37560: 0000000000000000 = 0
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37576: 656E204A656C6C79 = 740
37584: 5964204174716163 = 730
37592: 5B2E202020202020 = 348
37600: 0812000000000000 = 26
37608: 0000000000001206 = 26
37616: [illegible] = 55
37624: 2006060506050606 = 56
37632: 0000000000000000 = 0
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37656: 0606060606060606 = 49
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37688: 0606060606120606 = 60
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37704: 0000000000000000 = 0
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37720: 0006060606060606 = 44
37728: 0000000000000000 = 0
37736: 0000000000000000 = 0
37744: 0000000000000000 = 0
37752: 0000000000000000 = 0
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37776: 4FE001002C10BF38 = 515
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37792: 2CE01F58FE002C20 = 701
37800: 0000000000000000 = 0
37808: 0000000000000000 = 0
37816: 0000000000000000 = 0
37824: 2020202020202020 = 256
37832: 2054686520536861 = 612
```

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```
37840 6B65205069742020 = 605
37848 2020202020202020 = 256
37856 1000000000000000 = 16
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37880 0800000000120000 = 97
37888 C800000000000012 = 37
37896 C808070900000031 = 108
37904 C000111111111100 = 96
37912 1111111111001111 = 119
37920 0000000000200000 = 0
37928 0000000000000000 = 0
37936 0500000000000000 = 5
37944 0000050000050500 = 20
37952 0800080000002000 = 24
37960 0000808000050500 = 25
37968 300F090A0C100000 = 207
37976 2000050000050000 = 22
37984 0500000000000000 = 45
37992 0505051205000000 = 38
38000 0000000000000000 = 0
38008 0012050512000002 = 46
38016 001F0580F60FF002 = 647
38024 30707F2800F0E30A = 389
38032 8F500100030100A0 = 493
38040 00FF30909F200100 = 632
38048 28900F2002000000 = 416
38056 0000200000000000 = 0
38064 0000300000000000 = 0
38072 0000000000000000 = 0
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38088 6572205F6C6E6E74 = 755
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38104 2052616D7D616E65 = 733
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38208 0000000000001200 = 18
38216 0000000012000200 = 18
38224 0606060606060606 = 48
38232 0606060606060606 = 48
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38248 0000000000000000 = 0
38256 0000000000000000 = 0
38264 0000000000000000 = 0
38272 0057061E4F300001 = 261
38280 38484F2800013678 = 430
38288 4F8C000138A84F2A = 480
38296 0061360D84F28001 = 36
38304 3806AF2800013600 = 44
38312 0000000000000000 = 0
38320 0000000000000000 = 0
38328 0000000000000000 = 0
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38344 [illegible] = 662
38352 [illegible] = 790
38360 [illegible] = 528
38368 [illegible] = 0
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38384 0000000002000000 = 2
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38488 0000000000000000 = 0
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38512 0000000000000020 = 0
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38528 001F0580F2000001 = 293
38536 34808F2000C13480 = 538
38544 4F2000FF01504F20 = 609
38552 00FF34425F20FF00 = 769
38560 34936F2021002400 = 392
38568 0000000020000000 = 0
38576 0000000000000000 = 0
38584 0000000000000000 = 0
38592 2020202020202054 = 308
38600 6C6520455900E615 = 727
38608 2042617472656574 = 743
38616 2020202020202020 = 256
38624 0000003F06060707 = 41
38632 0707052E10000000 = 42
38640 0000000E00020000 = 11
38648 0000000000B00000 = 11
38656 0000000000000000 = 11
38664 0000000000000000 = 11
38672 0000000000000000 = 11
38680 0000000000000000 = 11
38688 [illegible] = 11
38696 [illegible] = 12
38704 [illegible] = 11
38712 [illegible] = 11
38720 [illegible] = 11
38728 [illegible] = 12
38736 [illegible] = 12
38744 [illegible] = 11
38752 [illegible] = 11
38760 [illegible] = 11
38768 [illegible] = 12
38776 [illegible] = 12
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38792 0C407F7001001042 = 456
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38824 0000200000000000 = 0
38832 0000200000000000 = 0
38840 0000300000000000 = 0
38848 0000074747474741 = 359
38856 7286220F0E0E0505 = [illegible]
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38872 4504060606064242 = 229
38880 4242424242420707 = 418
38888 0707424242420606 = 290
38896 3A06050505050707 = 45
38904 0707040404040303 = 36
38912 0303030303070707 = 40
38920 250390030C025700 = 459
38928 7A0262005402D100 = 517
38936 25039000540250D0 = 357
38944 7A02620054025800 = 412
38952 10025A003002AF00 = 632
38960 C50257007A026200 = 514
38968 E30245000301A300 = 533
38976 1002750001202750 = 270
38984 5A02660005102580 = 380
38992 7A02620003025700 = 514
39000 7A0262005402D100 = 517
39008 2802220024025300 = 357
39016 00000000AC403300 = 340
39024 1105620004033300 = 450
39032 1105620004033300 = 450
39040 3E043A00C7043300 = 378
39048 1105C500C0448000 = 526
39056 C40383001105C503 = 549
39064 C70463000C403830 = 637
39072 1105C500C4038300 = 549
39080 1105A200C1038300 = 460
39088 11058200C4038300 = 450
39096 3E043A00C7043300 = 378
39104 1105D500C7046800 = 528
39112 C4033300110BC500 = 549
39120 2C0005C005E03C00 = 435
39128 A707330000000000 = 305
39136 0000000000000000 = 0
39144 000000000000CD63 = 309
39152 9FC63F0E7A7F15CD = 722
39160 9C9E068F0E803E16 = 689
39168 CD9C9E0577DE783E = 840
39176 17CD9C9ECDB59E10 = 1111
39184 011007110218CE00 = 79
39192 2C5952428E035045 = 530
39200 4E54455220544F20 = 543
39208 5040415920404144 = 551
39216 2043415645524E53 = 562
39224 1300110015150012 = 98
39232 0440F70737269667 = 737
39240 6574203139383520 = 499
39248 4279204261726C20 = 646
39256 4A656565656E722E = 761
39264 1007FFCD218C3CD5 = 1013
39272 E200CD2D0C6800DD = 910
39280 2300E00DD23DD056 = 912
39288 00D0237C85E8E1DD = 1050
39296 E5D0580DCDE101FE = 769
39304 EF2C07CD8472004D = 1091
39312 1FCD86F2CD2CD728 = 937
39320 CEAF329C9F02919F = 1038
39328 329F9F3E03C29E9F = 763
39336 C2659F3E9F3F060F = 841
39344 0EFFFE3201CD9C9E = 1080
39352 7918134FF13D20F2 = 1034
39360 0E01CD0118CDE59E = 841
39368 1501001101FFAF32 = 521
39376 329F3A59F3C2979F = 1045
39384 328C9F3A8F8F672E = 858
39392 00110C8C1926207F = 539
39400 D72310FE22EF5C22 = 851
39408 ED9C0F0C06FD3E18 = 650
39416 FE2001012310F979 = 856
39424 323D9F2A5E9C06AF = 839
39432 0E007EFE0D0807E5 = 670
39440 C5CD9C9E11E12079 = 1290
39448 C6304FC3ED7AD610 = 918
39456 47FE0F20F57E3294 = 925
39464 9F237E32959F2323 = 748
39472 0ECA1080000D2198 = 450
39480 9F7E23DD77037E23 = 824
39488 DD770E7E23DD0702 = 847
39496 7E23DD77007E23DD = 983
39504 77017E23DD7705AF = 801
39512 DD77063DDD7707DD = 974
39520 1910DF3E02CD011E = 547
39528 CD8B9E1006130118 = 614
39536 140053132FE2453A = 458
39544 0D4C4E56C5403A18 = 469
39552 1407FFED45909FDD = 1102
39560 181ACDEB0E1C1337 = 690
39568 FF348F9F3C06001F = 760
39576 CD131AC61F5FE6E0 = 1057
39584 2803180000632807 = 421
39592 AF32959F32979F01 = 895
39600 FEF5ED7E6E1F57F5 = 1175
39608 0A6701FE7FED79EE = 1066
39616 1F6FF615F2C84E20 = 881
39624 04FE1F2803A9599F = 705
39632 3D3CFFFC28003306 = 671
39640 9F7CF61E577CFE0A = 1034
39648 A4C8432004FE1F28 = 735
39656 3C3A969F3C3CFE04 = 757
39664 280032969F01FEF5 = 928
39672 ED7E5701FEDFED76 = 1279
39680 F2E61FCE5D2004EE = 991
39688 1F23003A979F3C3C = 871
39696 FE04280332979F01 = 662
39704 FEFCED7E5701FFFF = 1327
39712 ED7EA2E617C85320 = 1098
39720 04EE1F28033A975F = 693
39728 3D3CFEFC28033297 = 872
39736 9F3A979F573A959F = 980
39744 E21730343F47305A = 940
39752 3C73D60F47CD5A9C = 1027
39760 79C60F4FCD5A9C78 = 964
39768 C50F47CD5A9C78FE = 1109
39776 E12807FE10280332 = 600
39784 959F3A559F573A94 = 968
39792 9F924F3A959F47CD = 1010
39800 D99C79C60F4FCDD9 = 1205
39808 9C78D60F47CDD99C = 1154
39816 79D62F4FCDD99C78 = 1120
39824 FEF1300332949F3A = 961
39832 949F4F3A959F473A = 881
39840 939F3CCD9C9EDD21 = 1109
39848 969F3E0632989FDD = 964
39856 8401DDCCC07C5E26 = 779
39864 577DD066D0DD7703 = 913
39872 4F7CDD6604DD7704 = 906
39880 47DD0403DD7E02DD = 920
39888 BE0620137CED44A0 = 891
39896 7701DE144DD77700 = 890
39904 AFDD77053A939FDD = 1106
39912 8606CD9C9E3A949F = 1023
39920 D60CDDBE033019C6 = 911
39928 180DBE0330193A9C = 719
39936 9FD60CDDBE043008 = 653
39944 C618DDBE04D2CD90 = 1209
39952 110800DD193A959F = 640
39960 3CC2AC9E3A929F3C = 1005
39968 32929FFE3C8C8F3D = 907
39976 7C9F01FE27EC78CE = 1368
39984 47201321C8001154 = 472
39992 00CDE503FF320850 = 714
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40008 FFFD785F01FE7FED = 1321
40016 7B83C547CAE893C3 = 1360
40024 3B9A25305461CB3D = 800
40032 CB3DCB3DCB3D3EAF = 1029
40040 90E6F05F19110000 = 751
40048 187EFEC0C3FED6C5 = 1145
40056 FE12281401FE07C2 = 996
40064 EA983A3C9F573A3C = 904
40072 EFBACA0E9DC38A9B = 1174
40080 3E56773AA39F3C3C = 704
40088 BC9FC573F50F4779 = 1059
40096 E6FC4FAFC3909EED = 1480
40104 4B929F030303ED43 = 691
40112 909FCD889E161407 = 902
40120 FFCD1B1A21CD0311 = 776
40128 0800CDE503210007 = 645
40136 110A00CDE5031114 = 469
40144 05111400CDE503C1 = 624
40152 C926000546CB3DCA = 895
40160 30CB3DCB303EAF90 = 970
40168 E3F05F1911000019 = 632
40176 71FE00C8FE55C8FE = 1374
40184 132895C1FE071297 = 1022
40192 931A8CCF873C0D97 = 957
40200 BA2800C3979BCD72 = 1059
40208 9F3A3F9F3C328F9F = 931
40216 FE0A12A839DD2103 = 1241
40224 8DD5E00DD2300D63 = 1082
40232 00DD23DD5E00DD23 = 827
40240 DD5600DD2317CB52 = 909
40248 09DDE5CD3503DDE1 = 1224
40256 18DFCD689FCDB89E = 1265
40264 1005110013011603 = 83
40272 001008594F555645 = 430
40280 2045534341504541 = 533
40288 2054484520414144 = 499
40296 2043415645524E53 = 562
40304 1E000C0A2E074154 = 572
40312 4043204F55544043 = 521
40320 4F52204F51444552 = 578
40328 2047414048532042 = 495
40336 5900002100850FA0 = 231
40344 2020202020204841 = 331
40352 524C204A45444645 = 542
40360 5E592E1003161509 = 279
40368 53434F52453A20FF = 725
40376 FF1E900AFCD1810F = 1040
40384 3208EC3A08ECFE0C = 852
40392 28F9C03E89CD7C9F = 1362
40400 0608C521E03E1104 = 535
40408 00CDE503ED1B949F = 1008
40416 3E13CD9C9E1A401F = 728
40424 1105CDCDE503ED4B = 723
40432 949FCE14CD9C9EC1 = 1101
40440 10D83A3E9F3D326E = 840
40448 6FCDA69D9CD690FC = 1047
40456 EB9E100411001515 = 425
40464 0053434F52453A16 = 460
40472 1507FFEC4B909FCD = 1103
40480 181ACDBE9E110210 = 638
40488 071C000020202020 = 188
40496 2020202020202020 = 256
40504 2020202020202020 = 256
40512 2020202020202020 = 256
40520 2020202020202020 = 256
40528 2020202020202047 = 295
40536 414D45204F564552 = 559
40544 2020202020202020 = 256
40552 2020202020202020 = 256
40560 2020202020202020 = 256
40568 2020202020202020 = 256
40576 2020202020202020 = 256
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40592 06FF10FE3B7CB820 = 911
40600 F7C3EE9335006FE5 = 1210
40608 110297197EE12623 = 820
40616 692929110085125F = 588
40624 CDC79E79C6084FCD = 1173
40632 C79F79F17EFEFF28 = 1455
40640 04C723155F72E9C5 = 990
40648 0EC5CD409F78C608 = 1180
40656 47CD409F78D60747 = 911
40664 CD409F79C6074FCD = 1033
40672 409F79C60747CD40 = 880
40680 9F79C6081C72409F = 984
40688 113E1232679F5E1E = 699
40696 30C5EE3EAF934797 = 1045
40704 1F371FA77FEAFE78 = 981
40712 A98779070707A8E8 = 811
40720 C7A007073F79E627 = 850
40728 47AFEB0EFF2800C8 = 954
40736 3FCBFFCB19CB3ACB = 1210
40744 1E13F40E6B277B79 = 905
40752 A5E277E1C1230534 = 960
40760 679F3D20E6D1C1C9 = 1140
40768 C8E5D5D6C8C3CB3C = 1360
40776 3835159026006F29 = 473
40784 2E2E2E2E2C3E9E59 = 684
40792 CB33162005919100 = 413
40800 5819D173E1C20900 = 1056
40808 2100400100153500 = 179
40816 3308789120F93E08 = 687
40824 CD0116C9C6A03E56 = 743
40832 2A6E9C8E20023612 = 624
40840 2310F3C900000000 = 530
40848 0000000000000000 = 0
40856 0000000000000000 = 0
40864 0000000000000000 = 0
40872 0000000000000000 = 0
40880 0000000000000000 = 0
40888 0000000000000000 = 0
40896 0000000000000000 = 0
40904 0000000000000000 = 0
40912 0000000000000000 = 0
40920 0000000000000000 = 0
40928 0000000000000000 = 0
40936 0000000000000000 = 0
40944 0042592048415240 = 485
40952 204F4E4845204E55 = 655
40960 2E00000000000000 = 46
40968 0000000000000000 = 0
40976 0000000000000000 = 0
40984 0000000000000000 = 0
40992 0000000000000000 = 0
41000 0000000000000000 = 0
41008 0000000000000000 = 0
41016 0000000000000000 = 0
41024 0000000000000000 = 0
41032 0000000000000000 = 0
```



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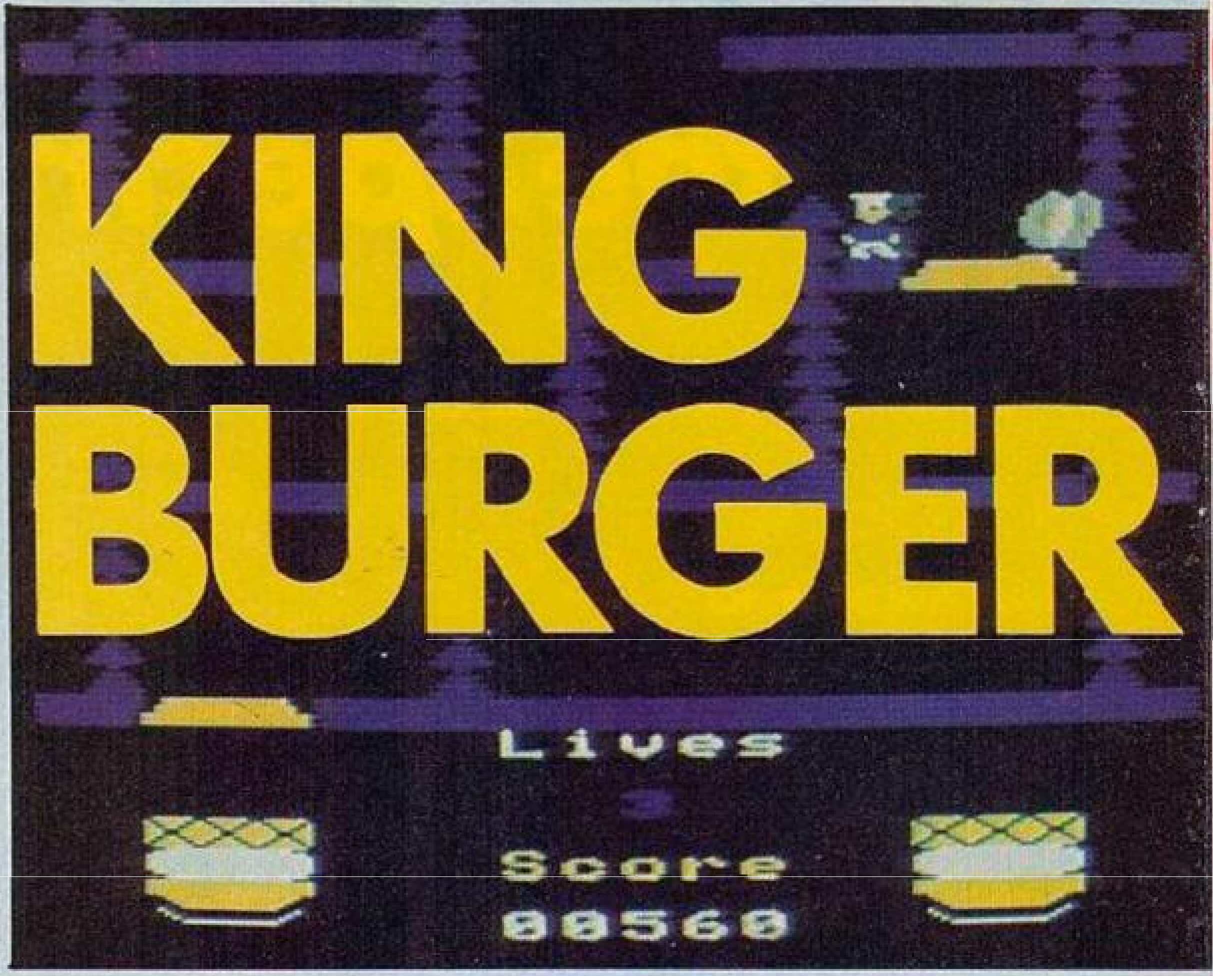
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Listing 1.

```
[illegible]
   20*F(7,48 [illegible]
   30*F(10,40 [illegible]
   40MODE5:F=1
   [illegible]
   100NEXT
   [illegible]
   120A$="Burger ... King" [illegible]
   130A$="Is Loading" [illegible]
   [illegible]
   170CHAIN""
   [illegible]
   240)NEXT
   [illegible]
   290RETURN
   300DEFPROCDBL(G) [illegible]
   [illegible]
   320ENDPROC
```



In King Burger you must move around the screen stepping on pieces of hamburger to make them fall to the bottom to become completed burgers. However, there is a fried egg called Freca trying to stop you.

The burgers are made in four sections each of which must be walked across causing it to fall down a level and knock down anything which is below it until it reaches the tray at the bottom. There are six levels, each of which gets progressively harder until, on the sixth sheet,

Listing 2.

```
   10DATA0,17,51,119,119,118,252,252,204,238,255,255,2
55,247,243,243
   20DATA254,255,255,119,119,51,2,6,247,238,238,204,20
4,204,6,0
   30F%=&5000
   40FORT=0TO31:READD:T?F%=D:NEXT
   50TEMP=F%+128:U%=TEMP+64:FORT=0TO2STEP2:P%=U%:[OPTT
   60LDA#&40:STA&D70:LDA#&5A:STA&D71:LDA#32:STA&D72:LD
A#21:STA&D73:LDA#1:STA&D74
   70LDA#TEMP MOD256:STA&D76:LDA#TEMP DIV256:STA&D77
   80LDA#0:STA&D75:LDY#0:TYA:.YS STATEMP,Y:INY:CPY#64:
BNEYS
   90LDA#64:STA&D78:LDA#89:STA&D79:LDA#0:STA&D7A:LDA#2
1:STA&D7B:LDA#0:STA&D7C:LDA#0:STA&D7D
   100LDA#(TEMP+32) MOD256:STA&D7E:LDA#(TEMP+32) DIV256
:STA&D7F:RTS
   110.rout JSRrub
   120LDA&A5:CMP#&FF:BEQN
   130LDA&A3:CMP&76:BNEnosam
   140LDA&A2:CMP&D02:BMInoleft:JSRleft:JMPNORU:.noleft
JSRright:.NORU JMPN
   150.nosam
   160LDA&A4:CMP#1:BNEno:JSRleft:JMPN:.no JSRright:.N
   170JSRSEE:LDA&A5:CMP#&FF:BNENOLAD:JSR_ADDR:.NOLAD
   180JSRDIS:JSRSAME:CPX#&FF:BEQySA:JSRBURG:CPX#&FF:BNE
ySA:JSRrub:JSRU%:JMPDIS:.ySA
   190.DIS CLC:LDA&A0:ADC#&30:STA&4D:LDA&A1:ADC#1:STA&4
E:LDY#0:.A LDAF%,Y:STA(&A0),Y:INY:CPY#16:BNEA:.B LDAF%
,Y:STA(&4D),Y:INY:CPY#32:BNEB:RTS
   200.check LDA&A4:CMP#0:BEQau:LDA&A2:CMP#0:BEQhit:JMP
AU:.au LDA&A2:CMP#38:BEQhit:.AU LDX#0:LDY#0:.C LDA(&4D
),Y:BEQhit:RTS:.hit LDX#&FF:RTS
   210.BURG LDX#0:SEC:LDA&A0:SBC#&40:STA&4D:LDA&A1:SBC#
1:STA&4E:LDY#0:.Bur LDA(&4D),Y:AND#240:BNEhit:INY:CPY#
16:BNEBur:RTS
   220.CHECK LDX#0:LDY#8:.AaA LDA(&4D),Y:CMPF%,Y:BEQhit
:INY:CPY#16:BNEAaA:RTS
   230.left LDA#1:STA&A4:CLC:LDA&A0:ADC#&78:STA&4D:LDA&
A1:ADC#2:STA&4E:JSRcheck:CPX#&FF:BEQright:SEC:LDA&A0:S
BC#16:STA&4D:LDA&A1:SBC#0:STA&4E:JSRCHECK:CPX#&FF:BEQE
END:SEC:LDA&A0:SBC#8:STA&A0:LDA&A1:SBC#0:STA&A1:DEC&A2
:JMPread
   240.EEND LDA#1:STA&A4:RTS
   250.right LDA#0:STA&A4:CLC:LDA&A0:ADC#&90:STA&4D:LDA
&A1:ADC#2:STA&4E:JSRcheck:CPX#&FF:BEQleft:CLC:LDA&A0:A
DC#16:STA&4D:LDA&A1:ADC#0:STA&4E:JSRCHECK:CPX#&FF:BEQl
eft:CLC:LDA&A0:ADC#8:STA&A0:LDA&A1:ADC#0:STA&A1:INC&A2
:JMPread
```

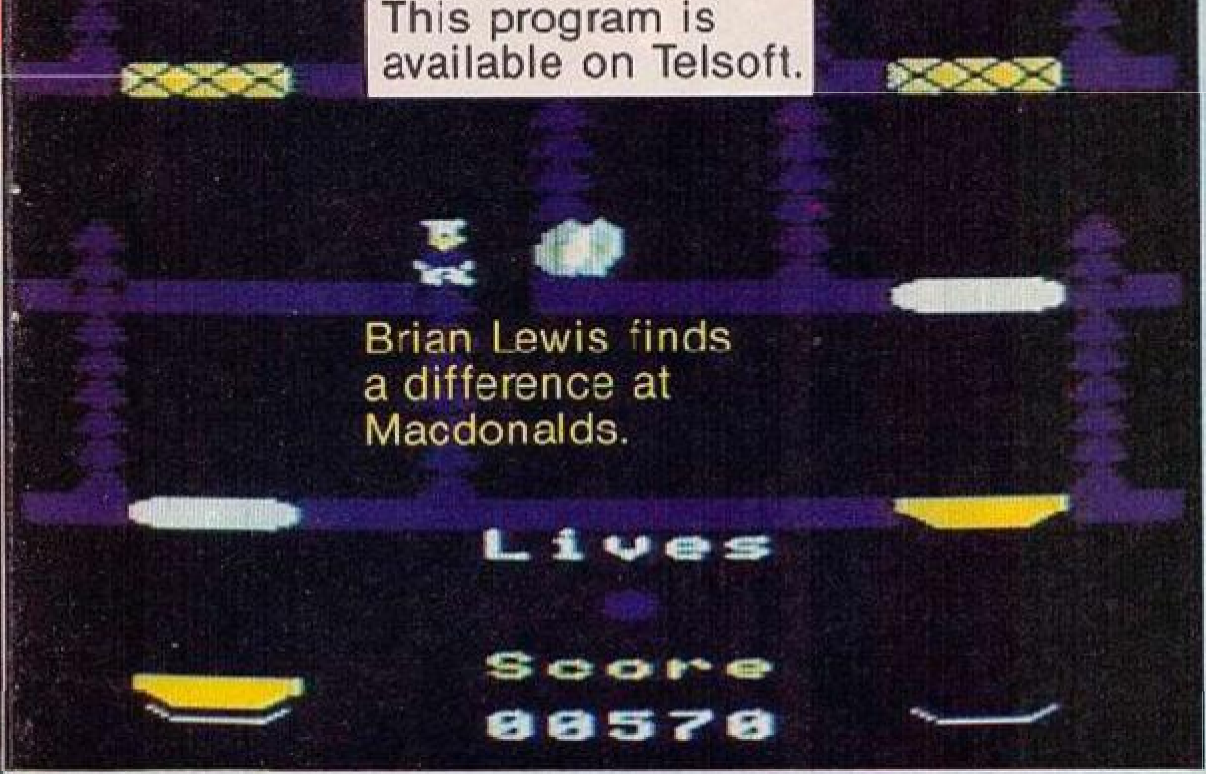
Listing 3

```
   10VDU23,130,31,31,63,63,255,255,255,0,23,131,255,25
5,255,255,255,255,255,0
   20VDU23,132,240,240,252,252,255,255,255,0,23,133,12
6,189,219,231,231,219,189,126
   30VDU23,134,31,127,255,255,255,255,127,31,23,135,25
5,255,255,255,255,255,255,255,23,136,248,254,255,255,2
55,255,254,248
   40VDU23,137,255,255,255,255,63,31,15,7,23,138,255,2
55,255,255,252,248,240,224
   50VDU23,139,32,16,8,7,0,0,0,0,23,140,0,0,0,255,0,0,
0,0,23,141,4,8,16,224,0,0,0,0
   60ENVELOPE1,1,2,10,2,5,2,10,126,0,0,-126,126,126
   70ENVELOPE2,1,10,-30,10,20,4,4,126,0,0,-126,126,126

   80VDU23,128,255,0,255,0,255,0,255,0,23,129,24,0,60,
0,126,0,255,0
   90DATA119,51,51,48,48,48,16,3,238,204,204,64,224,19
2,128,12,7,7,135,195,51,119,102,119,14,14,22,56,204,10
2,238,119
   100DATA119,51,51,48,48,48,16,3,238,204,204,64,224,19
2,128,12,22,22,22,7,3,17,17,17,14,14,14,134,12,136,136
,204
   110DATA119,51,51,32,112,48,16,3,238,204,204,192,192,
192,128,12,7,7,134,193,51,102,119,238,14,14,30,60,204,
238,102,238
   120DATA119,51,51,32,112,48,16,3,238,204,204,192,192,
192,128,12,7,7,7,22,3,17,17,51,134,134,134,14,12,136,1
36,136
   130DATA119,51,51,48,48,176,144,131,238,204,204,192,1
92,192,128,12,135,7,7,7,3,34,102,0,14,30,30,30,28,60,6
8,102
   140DATA119,51,51,48,48,48,16,3,238,204,204,192,192,2
08,144,28,7,135,135,135,131,34,34,102,30,14,14,14,12,6
8,102,0
   150DATA&11,0,1,0,120,0,1,0
   160DATA0,17,136,0,68,0,0,68,0,17,0,34,0,0,68,0
   170DATA0,0,1,0,20,0,3,0
   180DIM G% 6000:FORT=0TO222:READD:T?G%=D:NEXT:J%=G%-3
00:M1=G%:M2=M1+64:M3=M2+64:SO=M3+64:PEP=SO+8:SO2=PEP+1
6:TEMP=SO2+8
   190FORT=0TO2STEP2:P%=J%:[OPTT
   200LDA#G% MOD256:STA&70:LDA#G% DIV256:STA&71:LDA#&80
:STA&72:LDA#&73:STA&73:LDA#0:STA&60:STA&D02:STA&D03:ST
A&D04:STA&D05:STA&76:STA&D06:STA&D5E:STA&D5B
   210LDA#0:STA&A7:JSRL%:SEC:LDA&B0:SBC#5:STA&B0:JSRSCO
RE
   220.start JSRDIS
   230LDY#0:.wrT LDA&D50,Y:AND#240:CMP#96:BNEngs:JSRBUR
G:.hgs INY:CPY#8:BNEwrT
   240LDA&D5B:CMP#0:BEQtS:JSRMOBU:.tS
   250JSRH%
   260LDX#0:JSRflorr:CPX#&FF:BNEyr:RTS:.yr DEC&A3:LDX#0
:JSRflorr:CPX#&FF:BNEry:RTS:.ry INC&A3:INC&A3:LDX#0:JS
Rflorr:CPX#&FF:BNEVR:RTS:.VR DEC&A3
   270JSRdelay
   280LDA&D5B:CMP#0:BEQtTS:JSRMOBU:.tTS
```



This program is available on Telsoft.



Brian Lewis finds a difference at Macdonalds.

a second egg is introduced. My first major problem was to find a workable algorithm for the movement of the egg. I ended up partly pinching an idea I had seen in a friend of mine's game "Monsters" which he wrote some time ago on the Atom. The basic idea is that the egg or eggs check whether or not you are on the same level as them — if so they move towards you or else they move about randomly until they find a ladder and then, depending on your position, move up or down. Thanks to Andrew Greene for the idea.

The next problem was the movement of the two burgers. I solved this by setting aside eight memory locations, each containing a number which corresponds to the piece of burger and the extent to which it has been walked on. These memory locations are then moved around after the piece of burger has stopped moving. You have an advantage over Freda — the ability to drop one level and leave the egg stranded on a platform. However, this advantage is slowly taken away from you as you go through the six sheets. Any BBC users who wish to play the game will have to increase the numbers held in the X and Y registers in the "delay" routine and thus slow down the game. Each of the four programs should be typed in, checked, saved and then run to ensure you do not get a bad program. ■

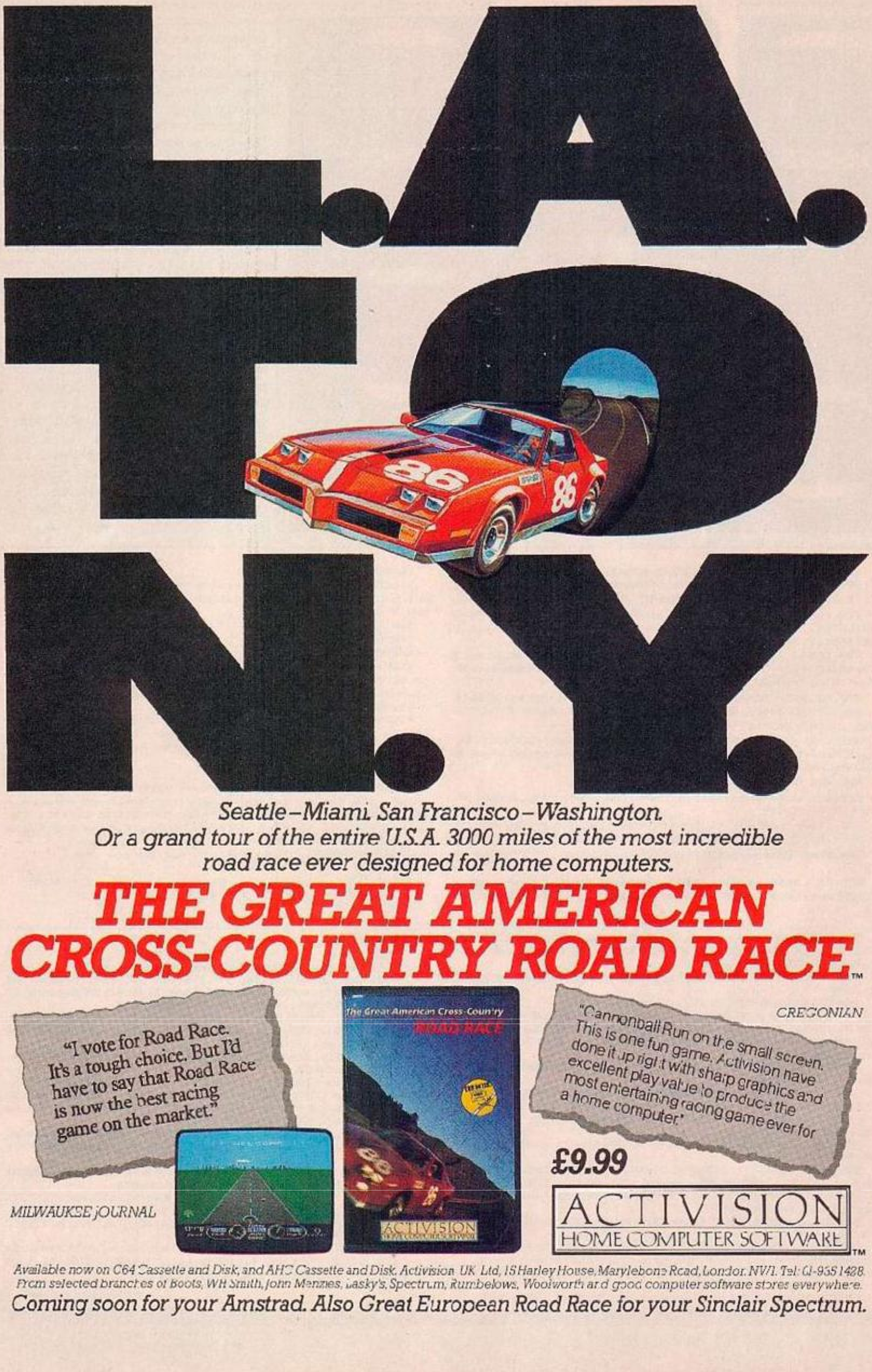
```
  260.rub CLC:LDA&A0:ADC#&30:STA&4D:LDA&A1:ADC#1:STA&4
E:LDY#0:.D LDA(&A6),Y:AND#15:STA(&A0),Y:INY:CPY#16:BNE
D:.E LDA(&A6),Y:AND#15:STA(&4D),Y:INY:CPY#32:BNEE:RTS
  270.read CLC:LDA&A0:ADC#&30:STA&4D:LDA&A1:ADC#1:STA&
4E:LDY#0:.F LDA(&A0),Y:STA(&A6),Y:INY:CPY#16:BNEF:.G L
DA(&4D),Y:STA(&A6),Y:INY:CPY#32:BNEG:RTS
  280.LADDR JSRfloor:CPX#&FF:BNESS:LDA&76:CMP&A3:.SS B
EQend:LDA#&FF:STA&A5:LDA&A3:CMP&76:BMInoup:JSRdown:JMP
NDw:.noup JSRup:.NDw:RTS
  290.up SEC:LDA&A0:SBC#&40:STA&4D:LDA&A1:SBC#1:STA&4E
:JSRcheck:CPX#&FF:BEQend:INC&A3:SEC:LDA&A0:SBC#&40:STA
&A0:LDA&A1:SBC#1:STA&A1:JMPread
  300.down CLC:LDA&A0:ADC#&C0:STA&4D:LDA&A1:ADC#3:STA&
4E:JSRcheck:CPX#&FF:BEQend:DEC&A3:CLC:LDA&A0:ADC#&40:S
TA&A0:LDA&A1:ADC#1:STA&A1:JMPread
  310.end LDA#0:STA&A5:RTS
  320.SEE LDY#4:LDA(&A6),Y:CMP#7:BEQFOUN:RTS:.FOUN LDA
#&FF:STA&A5:RTS
  330.floor LDA&A3:.IO CMP#0:BEQon:SEC:SBC#7:CMP#22:BP
L off:JMPIO:.off LDX#0:RTS:.on LDX#&FF:RTS
  340.SAME LDX#0:LDA&D58:CMP#0:BEQa1:RTS:.a1 LDX#&FF:R
TS
  350.1% LDY#0:.AaA LDA&D70,Y:STA&A0,Y:INY:CPY#8:BNEAa
A:JSRrout:LDY#0:.BbB LDA&A0,Y:STA&D70,Y:INY:CPY#8:BNEB
bB
```

```
  360LDA&BA:CMP#0:BEQRWR:
  370LDY#0:.CcC LDA&D78,Y:STA&A0,Y:INY:CPY#8:BNECcC:JS
Rrcut:LDY#0:.DdD LDA&A0,Y:STA&D78,Y:INY:CPY#8:BNEDdD:.
RWR RTS
  380]:NEXT
  390MODE4
  400PRINTTAB(14,2);"Burger King!"
  410PRINT''"You (GORDON BLUE the chef) must go roundt
he screen knocking down pieces of the  burgers to form
 two stacked burgers  in the bottom trays."
  411PRINT'
  420PRINT'However a rampart fried egg (FREDA) is  try
ing to stop you in your task.if she  touches you then
you loose one of your  lives an the burgers are reset.
"
  421PRINT'
  430PRINT'There are six screens each of which getspro
gressively harder as you slowly looseyour advantages o
ver FREDA,your            advantage being the ability to
drop one level without killing yourself,drop any futhe
r and it's bye bye."
  440PRINTTAB(5);"The controls for Gordon are :-"
  441PRINT'
  450PRINT'Z - Left , X - Right , * - UP , / - DOWN"
  460VDU28,0,31,39,28,17,129,17,0,12
  470CHAIN""
```

```
  290JSRSEE:CPX#&FF:BNEgs:LDA#&FF:STA&D04:INC&D05:DEC&
76:JSRdrop:JMPhy:.gs LDA&D05:CMP#8:BMIhE:RTS:.hE LDA#0
:STA&D04:STA&D05:.hy
  300LDA&D59:CMP#&FF:BEQuYS:LDA&D58:CMP#0:BNEuYS:JSRse
e:.uYS
  310LDA&D04:CMP#&FF:BNEHYS:JMPnole:.HYS
  320LDA&D02:CMP#38:BEQnori:LDA#&81:LDX#&BD:LDY#&FF:JS
R&FFF4:CPY#&FF:BNEnori:JSRrub:LDA&D03:CMP#0:BEQrig:LDA
#M1 MOD256:STA&70:LDA#M1 DIV256:STA&71:LDA#0:STA&60:LD
A#0:STA&D03:.rig
  330JSRani:INC&D02:CLC:LDA&72:ADC#8:STA&72:LDA&73:ADC
#0:STA&73:JSRread
  340.nori LDA&D02:CMP#0:BEQnole:LDA#&81:LDX#&9E:LDY#&
FF:JSR&FFF4:CPY#&FF:BNEnole:JSRrub:LDA&D03:CMP#1:BEQle
f:LDA#M2 MOD256:STA&70:LDA#M2 DIV256:STA&71:LDA#0:STA&
60:LDA#1:STA&D03:.lef
  350JSRani:DEC&D02:SEC:LDA&72:SBC#8:STA&72:LDA&73:SBC
#0:STA&73:JSRread
  360.nole LDA#&81:LDX#&B7:LDY#&FF:JSR&FFF4:CPY#&FF:BN
Enoup:JSRCEH:CPX#&FF:BNEnoup:INC&76:JSRrub:LDA&D03:CMP
#2:BEQup:LDA#M3 MOD256:STA&70:LDA#M3 DIV256:STA&71:LDA
#0:STA&60:LDA#2:STA&D03:.up
  370JSRani:SEC:LDA&72:SBC#&40:STA&72:LDA&73:SBC#1:STA
&73:JSRread
  380.noup LDA#&81:LDX#&97:LDY#&FF:JSR&FFF4:CPY#&FF:BN
Enodow:JSRcheck:CPX#&FF:BNEnodow:DEC&76:JSRrub:LDA&D03
:CMP#2:BEQdow:LDA#M3 MOD256:STA&70:LDA#M3 DIV256:STA&7
1:LDA#0:STA&60:LDA#2:STA&D03:.dow
  390JSRani:CLC:LDA&72:ADC#&40:STA&72:LDA&73:ADC#1:STA
```

```
&73:JSRread
  400.nodow
  410LDA&D58:CMP#0:BNERz:RTS:.Rz JMPstart
  420.rub LDY#0:.A LDATEMP,Y:STA(&72),Y:INY:CPY#16:BNE
A:CLC:LDA&72:ADC#&30:STA&4D:LDA&73:ADC#1:STA&4E:.A1 LD
ATEMP,Y:STA(&4D),Y:INY:CPY#32:BNEA1:RTS
  430.ani LDX#SO MOD256:LDY#SO DIV256:LDA#7:JSR&FFF1:L
DA&60:CMP#1:BEQB:CLC:LDA&70:ADC#32:STA&70:LDA&71:ADC#0
:STA&71:LDA#1:STA&60:RTS
  440.B SEC:LDA&70:SBC#32:STA&70:LDA&71:SBC#0:STA&71:L
DA#0:STA&60:RTS
  450.delay LDX#80:.D LDY#90:.E DEY:BNEE:DEX:BNED:RTS
  460.read LDY#0:.F LDA(&72),Y:STATEMP,Y:INY:CPY#16:BN
EF:CLC:LDA&72:ADC#&30:STA&4D:LDA&73:ADC#1:STA&4E:.G LD
A(&4D),Y:STATEMP,Y:INY:CPY#32:BNEG:RTS
  470.check LDX#0:CLC:LDA&72:ADC#&80:STA&4D:LDA&73:ADC
#2:STA&4E:LDY#0:LDA(&4D),Y:CMP#1:BEQH:RTS:.H LDX#&FF:R
TS
  480.CEH LDX#0:SEC:LDA&72:SBC#&40:STA&4D:LDA&73:SBC#1
:STA&4E:LDY#0:LDA(&4D),Y:CMP#1:BEQH:RTS
  490.SEE CLC:LDA&72:ADC#&80:STA&4D:LDA&73:ADC#2:STA&4
E:LDY#4:LDA(&4D),Y:CMP#0:BEQH:RTS
  500.drop JSRrub:CLC:LDA&72:ADC#&40:STA&72:LDA&73:ADC
#1:STA&73:JMPread
  510.DIS LDY#0:.a LDA(&70),Y:STA(&72),Y:INY:CPY#16:BN
Ea:CLC:LDA&72:ADC#&30:STA&4D:LDA&73:ADC#1:STA&4E:.b LD
A(&70),Y:STA(&4D),Y:INY:CPY#32:BNEb
```

(continued on page 71)



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(continued from page 69)

```
520RTS
530.scroll JSRSCORE:LDY#7:CLC:LDA&72:ADC#&80:STA&4D:LDA&73:ADC#2:STA&4E:LDA(&4D),Y:PHA:LDY#6:.e LDA(&4D),Y:INY:STA(&4D),Y:DEY:DEY:CPY#&FF:BNEe:LDY#0:TYA:STA(&4D),Y:LDA&4D:STA&6D:LDA&4E:STA&6E:CLC:LDA&4D:ADC#&40:STA&4D:LDA&4E:ADC#1:STA&4E
540LDY#0:PLA
550STA(&4D),Y:RTS
560.see CLC:LDA&72:ADC#&80:STA&4D:LDA&73:ADC#2:STA&4E:LDY#0:LDA(&4D),Y:AND#240:CMP#0:BEQqW:JSRscroll:JSRWHER:.qW RTS
570.WHER LDY#0:LDA#18:CMP&D02:BPLover:LDY#4:.over LDA#21:.OV STA&4D:LDA&76:CMP&4D:BEQfoun:INY:SEC:LDA&4D:SBC#7:CMP#249:BNEOV:RTS
580.foun LDA&D50,Y:STA&4D:AND#240:CLC:LSRA:LSRA:LSRA:LSRA:TAX:INX:TXA:CLC:ASLA:ASLA:ASLA:ASLA:STA&4E:LDA&4D:AND#15:ORA&4E:STA&D50,Y:RTS
590.BURG CPY#3:BEQrew:CPY#7:BEQrew:TYA:TAX:INX:LDA&D50,Y:AND#15:STA&A5K,X:.rew TYA:PHA:LDA&D50,Y:STA&4D:LDX#2:LDA#18:CMP&D02:BPLOVE:LDX#15
600.OVE LDA&D50,Y:AND#15:STA&D50,Y:CPY#0:BEQa1:CPY#4:BEQa1:CPY#1:BEQa2:CPY#5:BEQa2:CPY#2:BEQa3:CPY#6:BEQa3:CPY#3:BEQa4:CPY#7:BEQa4:RTS
610.a1 LDY#3:JMPa5:.a2 LDY#10:JMPa5:.a3 LDY#17:JMPa5:.a4 LDY#24:.a5
620STX&90:STY&91:JSRfill:PLA:TAY:STY&92
630.print LDA&D50,Y:AND#15:CMP#0:BEQb1:CMP#1:BEQb2:CMP#2:BEQb3:CMP#3:BEQb4
640.b1 LDA#130:STA&960:LDA#131:STA&961:LDA#132:STA&962:LDA#2:STA&4D:LDA#128:STA&4E:JMPb5:.b2 LDA#133:STA&960:STA&961:STA&962:LDA#2:STA&4D:LDA#128:STA&4E:JMPb5
650.b3 LDA#134:STA&960:LDA#135:STA&961:LDA#136:STA&962:LDA#3:STA&4D:LDA#128:STA&4E:JMPb5:.b4 LDA#137:STA&960:LDA#135:STA&961:LDA#138:STA&962:LDA#2:STA&4D:LDA#128:STA&4E:.b5 LDA#17:JSR&FFEE:LDA&4D:JSR&FFEE:LDA#17:JSR&FFEE:LDA&4E:JSR&FFEE
660LDA#31:JSR&FFEE:LDA&90:JSR&FFEE:LDA&91:JSR&FFEE:LDY#0:.resY LDA&960,Y:JSR&FFEE:INY:CPY#3:BNEresY:INC&D58:RTS
670.DrUB LDA#17:JSR&FFEE:LDA#128:JSR&FFEE:LDA#31:JSR&FFEE:TXA:JSR&FFEE:INY:TYA:JSR&FFEE:LDA#32:JSR&FFEE:JSR&FFEE:JMP&FFEE
680.MOBJ LDX&90:LDY&91:DEY:JSRDrUB:LDY&92:INC&91:JSRprint:JSRBOT:LDA&D58:CMP#6:BNEhSa:JSRsEE3:.hSa LDA&D58:CMP#7:BEQeND:RTS
690.eND LDY&92:LDA#0:STA&D58:LDA&D50,Y:AND#15:STA&D50,Y:STA&4D:LDA&D59:CMP#&FF:BNEHS:INC&92:LDY&92:LDA&D50,Y:ORA#96:STA&D50,Y:LDA#0:STA&D59:JMPsou:.HS LDY#0:.jh LDA&DC0,Y:AND#240:ORA&A50,Y:STA&D50,Y:INY:CPY#8:BNEjh:RTS
700.sEE3 LDA#31:JSR&FFEE:LDA&90:JSR&FFEE:LDX&91:INX:TXA:JSR&FFEE:LDA#135:JSR&FFF4:CPX#128:BEQqz:LDA#&FF:STA&D59:STA&D5A:.qz RTS
710.BOT LDA#25:CMP&91:BPLtYS:LDA#31:JSR&FFEE:LDA&90:JSR&FFEE:LDY&91:INY:TYA:JSR&FFEE:LDA#135:JSR&FFF4:CPX#32:BEQtYS:LDA#7:STA&D58:INC&D58:JSRSCORE:JSRSCORE:JSRSCORE:JSRSCORE:.tYS RTS
720.fill LDA&D5A:CMP#&FF:BEQaz:LDA#17:JSR&FFEE:LDA#128:JSR&FFEE:LDA#17:JSR&FFEE:LDA#1:JSR&FFEE:LDA#31:JSR&FFEE:TXA:JSR&FFEE:TYA:JSR&FFEE:LDA#128:JSR&FFEE:JSR&FFEE:JSR&FFEE:.az LDA#0:STA&D5A:INC&91:RTS
730.sou LDA#7:LDX#&502 MOD256:LDY#&502 DIV256:JMP&FFF1
740.florr LDA&A2:CMP&D02:BNEaA1:LDA&A3:CMP&76:BNEaA1:LDX#&FF:RTS:.aA1 LDY&A2:INY:CPY&D02:BNEiS:LDA&A3:CMP&76:BNEiS:LDX#&FF:RTS:.iS DEY:DEY:CPY&D02:BNEsI:LDA&A3:CMP&76:BNEsI:LDX#&FF:RTS:.sI RTS
750.SCORE LDA#17:JSR&FFEE:LDA#3:JSR&FFEE:CLC:LDA&B0:ADC#5:STA&B0:CMP#10:BNESHOW:LDA#0:STA&B0:INC&B1:LDA&B1:CMP#10:BNESHOW:LDA#0:STA&B1:INC&B2:LDA&B2:CMP#10:BNESHOW:LDA#0:STA&B2:INC&B3:LDA&B3:CMP#10:BNESHOW:LDA#0:STA&B3:INC&B4
760.SHOW LDY#0:LDX#12:.vinc LDA#31:JSR&FFEE:TXA:JSR&FFEE:LDA#31:JSR&FFEE:LDA&B0,Y:CLC:ADC#48:JSR&FFEE:INY:DEX:CPY#5:BNEvinc:RTS
770]:NEXT:CHAIN""
```

Listing 4.

```
10VDU23,142,0,31,31,63,63,255,255,255
20VDU23,143,0,126,189,219,231,231,219,189
30VDU23,144,0,31,127,255,255,255,255,127
40VDU23,145,0,255,255,255,255,63,31,15
41VDU23,146,0,1,3,7,7,31,15,63,23,147,63,63,31,63,127,63,31,31
42VDU23,148,31,63,63,63,127,63,127,63,23,149,63,31,31,15,7,3,3,0
50MODE5:VDU23;8202;0;0;0;0;19,1,4;0;
60DIMA$(3):A$(0)=CHR$130+CHR$131+CHR$132:A$(1)=CHR$133+CHR$133+CHR$133:A$(2)=CHR$134+CHR$135+CHR$136:A$(3)=CHR$137+CHR$135+CHR$138
70DATA2,2,3,2
80PROCDEMO
90COLOUR128:CLS:lives%=3:SC%=0:FORT=0TO4:T?&B0=0:NEXT
100RESTORE70:FORT%=0TO3:READD:COLOURD:PRINTTAB(8,T%+14);A$(T%);:NEXT
110FORG=0TO1000:NEXT:SOUND0,1,4,4
111VDU5:GCOL0,0:MOVE640,576:VDU146,10,8,147,10,8,148,10,8,149,10,8
120VDU4:COLOUR3:PRINTTAB(5,6);"SHEET NO.";SC%+1
130FORG=0TO1000:NEXT:CLS
140FORT%=0TO31:T%?(G%-224)=0:NEXT
150FORT%=0TO7:A%=T%:IF A%>3 A%=(A%-4)
160T%?&D50=A%:T%?&A50=A%:NEXT
170FORT%=0TO31:T%?(G%+224)=0:NEXT:FORT%=1TO3:VDU19,T%,0;0;:NEXT
180COLOUR1:FORT%=3TO24STEP7:PRINTTAB(0,T%);STRING$(20,CHR$128);:NEXT
181IF SC%>4 THEN ?&BA=1 ELSE ?&BA=0
190IF SC%<4 PRINTTAB(8,3);"   "
200IF SC%<2 THEN PRINTTAB(8,17);" "
210FORT%=1TO9:PRINTTAB(1,T%);CHR$129TAB(7,T%);CHR$129TAB(18,T%);CHR$129:NEXT
220FORT%=8TO16:PRINTTAB(9,T%);CHR$129:IF SC%<4 THEN PRINTTAB(13,T%);CHR$129
230NEXT
240FORT%=15TO23:PRINTTAB(1,T%);CHR$129TAB(7,T%);CHR$129;TAB(18,T%);CHR$129;:NEXT
250IF SC%>0 AND SC%<4 THEN FORT%=8TO16:PRINTTAB(7,T%);CHR$129:NEXT
260IF SC%>=3 THEN FORT%=1TO9:PRINTTAB(13,T%);CHR$129:NEXT
270RESTORE70:FORT%=3TO24STEP7:READD:COLOURD:PRINTTAB(2,T%);A$((T%-3)/7):TAB(15,T%);A$((T%-3)/7);:NEXT
280COLOUR3:VDU31,2,31,139,140,141,31,15,31,139,140,141
290PRINTTAB(8,25);"Lives":COLOUR1:PRINTTAB(10,27);lives%:COLOUR2:PRINTTAB(8,29);"Score"
300RESTORE310:FORT%=1TO3:READD:VDU19,T%,D;0;:SOUND&11,1,T%*70,5:FORG=0TO1000:NEXT,
310DATA4,3,7
320CALLJ%
330*FX15,0
340IF ?&D5B=8 THEN 390
350COLOUR128:SOUND0,1,255,255
360FORT%=0TO10:FORG=0TO30:NEXT:VDU19,0,1;0;:SOUND&11,2,30,20:FORG=0TO30:NEXT:VDU19,0,0;0;:NEXT:*FX21,5
370lives%=lives%-1:IF lives%=-1 THEN 420
380COLOUR128:CLS:GOTO150
390FORT%=0TO255STEP5:SOUND1,1,T%,1:NEXT
400SC%=SC%+1:VDU28,0,31,19,25:FORT%=1TO8:PRINTTAB(0,0);CHR$11;:SOUND&11,1,T%*20,15:NEXT:VDU26:*FX21,5
410CLS:GOTO100
420CLS:COLOUR2:PRINTTAB(5,16);STRING$(10,CHR$133);:A$="GAME  OVER":COLOUR1:FORT%=1TOLENA$
430PRINTTAB(T%+4,16);MID$(A$,T%,1)
440SOUND&11,2,T%+25,6:FORG=0TO200:NEXT,
450*FX15,1
460COLOUR3:PRINTTAB(0,18);"PRESS SPACE TO START"
470A$=INKEY$(500):IF A$="" THEN PROCDEMO ELSE GOTO90
480GOTO90
490DEFPROCDEMO:?&BA=0
500CLS
510COLOUR1:PRINTTAB(0,12);STRING$(20,CHR$128);
520COLOUR2:PRINTTAB(8,12);A$(1):COLOUR3:PRINTTAB(8,13);A$(2):COLOUR2:PRINTTAB(8,14);A$(3)
530COLOUR3:PRINTTAB(3,19);"KISS YOUR YOKE":COLOUR2:PRINTTAB(6,21);"GOOD BYE":COLOUR1:PRINTTAB(7,23);"SUCKER"
540CALLU%:?&D70=&80:?&D71=&A4:?&D74=0:?&D72=1:?&D02=39
550FORT%=0TO5000:NEXT
560FORT%=0TO17:CALLI%
570SOUND&11,1,25,10
580FORG=0TO50:NEXT,
590FORT%=0TO700:NEXT:COLOUR2:FORT%=0TO10
600PRINTTAB(8,T%);A$(0)
610FORT=0TO60:NEXT:SOUND&11,2,T%*20,10
620PRINTTAB(8,T%);"   ";:NEXT
630PRINTTAB(8,T%);A$(0):COLOUR3:PRINTTAB(7,10);"\'TAB(4,9);"AHH!"
640FORT%=0TO13000:NEXT
650CLS:RESTORE70:FORT%=0TO3:READD:COLOURD:PRINTTAB(2,T%);A$(T%);TAB(15,T%);A$(T%);:NEXT
660COLOUR3:PRINTTAB(5,0);"PREPARE TO":COLOUR2:PRINTTAB(6,1);"MEET THY":COLOUR1:PRINTTAB(8,2);"DOOM"
670FORT%=0TO27:PRINTTAB(0,0);CHR$11:SOUND&11,1,T%*8,1:FORG=0TO50:NEXT,
680PRINTTAB(19,31):SOUND0,-15,5,5:FORG=0TO90:NEXT
690PRINTTAB(0,0);CHR$11:SOUND0,-15,5,5:FORG=0TO90:NEXT
700FORG=0TO100:NEXT:A$="IN BRIAN LEWIS'S":B$="ALL NEW!":C$="BURGER KING!"
710FORT%=1TOLENA$:PRINTTAB(1+T%,10);MID$(A$,T%,1);:SOUND&11,2,T%*20,1:FORG=0TO90:NEXT,
720COLOUR2:FORT%=1TOLENB$:PRINTTAB(5+T%,12);MID$(B$,T%,1);:SOUND&11,2,T%*20,1:FORG=0TO60:NEXT,
730COLOUR3:FORT%=1TOLENC$:PRINTTAB(3+T%,14);MID$(C$,T%,1);:SOUND&11,2,T%*20,1:FORG=0TO60:NEXT,
731*FX15,1
740PRINTTAB(0,23);"PRESS SPACE TO START":REPEAT:UNTIL GET=32
750CLS:ENDPROC
```

CORE



Jon Cottrell makes war, not love, on his BBC.

MOST PROGRAMMERS seem to play arcade games in their spare hours, but now, from America, the land of hacking, the Big Mac and War Games comes the new line in strategy games — Core Wars.

I first came across the idea of Core Wars in, unsurprisingly, an American magazine, *Scientific American*, a few months ago. The idea seemed excellent, so I dug out my Advanced User Guide, and put together this half Basic, half machine code version of Core Wars, to the best of my knowledge, the first version in this country.

The game scenario is original — the Americans have succeeded in penetrating a giant Russian mainframe, and each player is trying to cause his opponent's program to crash, by the simple means, familiar to all machine code junkies, of making it execute an illegal instruction.

In Core Wars, two programs try to deliberately corrupt each other. A number of techniques have been developed so far; there are the simple methods like overwriting sections of memory at random, or alternatively, "intelligent" methods involving searching out the opposing program. Most people who have written machine code will be familiar with the problem — an incautiously calculated jump, and the processor is trying to execute data rather than a program, with unpredictable and surprising results.

This means the game is played by two players. Each writes a program, of maximum length 100 lines, in a specially-developed language called Redcode, which looks rather like a stripped-down assembly language. These programs are then assembled; play takes place in a memory space of the 3000 locations in the "core" from which the game takes its name — core is a now obsolete term once used to describe a computer's memory space — and each location can contain either a single Redcode instruction, or a piece of data.

If you try to execute data as an instruction, the program will not recognise it, and the opposing one will win! The core is organised slightly differently from a present-day memory, in that core location 2999 "wraps round" and is next to location 0. This means that attempting to access location 3000 results in accessing location 0, and so on. Then play starts for real — the computer executes one instruction from each player's program in turn, rather in the manner of a time-sharing system. Play continues until one program is forced to crash by executing an invalid instruction, and so the other player wins.

Obviously, one simple tactic is just to write a program that overwrites various areas of memory at random, hoping to score a 'hit' on a vital part of the other program, making it crash when it tries to execute that part. But an experienced player could find a way round such an attack — if he set up a block of memory with known contents, which was continuously checked, as soon as a byte was corrupted, he could arrange for his program to transfer itself somewhere in memory less vulnerable, and start a counter-attack.

Easy to pick up

The sort of instructions used will be immediately familiar to anyone who has dabbed in machine code, but don't despair if you never adventured beyond Basic — the limited instruction set will be easy to pick up, and will leave you with some knowledge of the techniques used in genuine machine code. At this point it seems appropriate to describe briefly the instruction set and some details of how the instructions are assembled, and then run through how to use the program.

Each instruction has a code, as for any assembly language, also a mnemonic. The mnemonic is what you might consider the 'real' instruction — it is the mnemonic that you type in to the computer as a line of your Redcode program. The instructions are dealt with in numerical order of code.

Each instruction has either one or two "arguments" — the numbers that follow the mnemonic. The largest argument allowed is 3000 — anything larger will be reduced modulus 3000. Negative arguments are assembled in "complement form"; i.e. an argument of –1 becomes 2999, since subtracting 1 has the same effect as adding 2999 in a core of 3000 contiguous locations.

0 — DAT — Used for putting data in a location. Although this instruction has a code of 0, it is a special case, as it assembles as an unexecutable instruction followed by the byte of data. Strictly speaking, any location in the core containing an unexecutable statement followed by data could be regarded a data statement, but DAT is provided to actually store data in specified locations. It takes one argument.

1 — MOV — Moves data from one location to another. It takes two arguments, so the format is MOV a,b. It will move the contents of location a to location b, without affecting the contents of a.

1 — ADD — This instruction takes two arguments, which makes its format ADD a,b. It adds the contents of location a to the contents of location b, leaving the result as the new contents of b, and leaving the contents of a unchanged.

3 — SUB — Takes two arguments, so its format is SUB a,b. The effect is to subtract the contents of location a from location b, leaving the contents of a unchanged.

4 — JMP — Has but one argument, which makes its format JMP a. It is an unconditional jump to location a — used for the same purpose as Goto in Basic, but is relative rather than absolute, as explained below.

5 — JMZ — This is a conditional jump instruction which takes two arguments, making its format JMZ a,b. If the contents of location b is 0, the program will jump to relative location a — otherwise it will carry on with the next instruction after the JMZ.

6 — JMG — As above, except that a jump occurs if the contents of location b is greater than zero.

7 — DJZ — Takes two arguments, making

```
   10ON ERROR RESTORE:VDU
 26:CLS:CLEAR:RUN
   20DIM code 1000.table
17,arg 8,PC(1).IN$(8).B$(
1)
   30DIM mode 1.gover 0.a
rgL 1,argH 1,mask 1.data
1.PC 1
   40current=&74:?mask=15
:mask?1=240
   50DIM row 0.col 0.flag
 0
   60DIM base 11999.p$(1,
100),E(1).ad(1)
   70FOR LL=0 TO 2 STEP 2
   80P%=code
   90[ OPT LL
  100.convert LDA &70
  110CLC:ROL A
  120STA &72
  130LDA &71
  140ROL A
  150STA &73
  160CLC:DEY
  170LDA &72
  180RCL A:STA &72
  190LDA &73
  200RCL A
  210STA &73
  220CLC
  230LDA #base MOD 256
  240ADC &72
  250STA &72
  260LDA &73
  270ADC #base DIV 256
  280STA &73
  290RTS
  300.get LDA (current).Y
  310STA argL.X
  320TYA:PHA
  330LDY #3
  340LDA (current).Y
  350AND mask.X
  360CPX #1
  370BNE [illegible]
  380CLC:ROR A:ROR A
  390ROR A:ROR A
  400.tran STA argH.X
  410LDA PC:CLC
  420ADC argL.X
  430STA argL,X
  440LDA PC+1
  450ADC argH,X
  460STA argH.X
  470JSR sizeck
  480PLA:TAY
  490RTS
  500.getbyte LDA data
  510STA &70
  520LDA data+1
  530STA &71
  540LDY #2
  550LDA (&70).Y
  560STA data
  570INY
  580LDA (&70),Y
  590STA data+1
  600RTS
  610.start LDA PC
  620STA &70
  630LDA #0
  640STA flag
```



WARS

the format DJZ a,b. The effect is to decrement the contents of location b by one, then jump to location a if the contents of location b is now 0.

8 — CMP — this also has two arguments, so its format is CMP a,b. It compares the contents of location a and location b, and if they are not equal to each other, the computer will skip the next instruction, and continue execution with the one after.

Assumes direct mode

As I have said, arguments lie in the range 0-2999 when assembled, but in addition, each can take one of three modes, called addressing modes. These modes are immediate, direct and indirect. Unless you specify otherwise, the computer assumes the argument is in direct mode. Prefixing the argument with # means it is immediate, and prefixing with @ means it is indirect. Taking as an example the complete instruction MOV 0,1 the full effect would be:

(1) The computer finds neither argument has a prefix, so assumes both are direct.

(2) It therefore adds the first argument onto the current address to find out where to get the data to be moved from, and then adds the second argument onto the current address to find out where to put it.

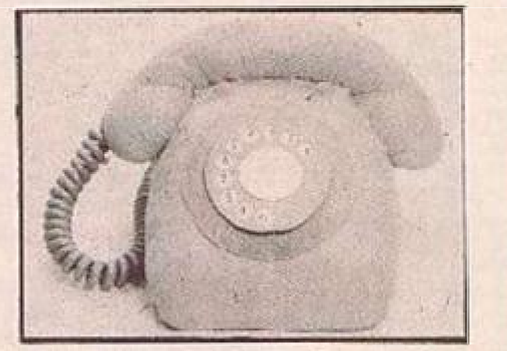
The instruction therefore moves the data 0 locations beyond the instruction — i.e. the instruction itself — to a position 1 location beyond the instruction i.e. in the next location. Incidentally, this is an example of a complete one-line program — when the instruction has been executed, the computer will look for the next instruction, and find the instruction "MOV 0,1" that has been put there by the previous one, and execute this, and this will continue, leaving a trail of MOV 0,1's throughout the core.

Machine code programmers will have noticed that the direct mode, as are all modes, is relative — there is no way for a program to know its absolute address in the core, and the start address for each program within the core is assigned randomly on assembly.

The other two modes I mentioned work as follows — first immediate mode. This causes the argument to be interpreted as a number, rather than an address in core. This means that MOV #3,2 will place the number 3 in the location 2 places further on from the present one, as opposed to MOV 3,2, which would copy the contents of the location three places on from the present one into the location two on from the present one.

Indirect mode is rather more complicated, and is best explained by an example.

ADD @2,4 means "read the contents on location 2. Add this number on to the current location. Now read the contents of this location, and that is the value to be added to that four locations on from the current one."



This program is available on Telsoft.

So, if you're still with me, type in the program, save it and type Run. After the title page press space and you should see the second screen, headed 'Phase 1 — Redcode entry', and below that, the heading 'Player 1' and an input prompt, '0 >'. Here's where you use those instructions I just explained, and type in your program.

Remember, you have a maximum of 100 lines of program each, and each prompt is numbered to show you how you're doing for space.

When you finish your program, press Return in response to the prompt, and then the other player will be given the chance to input his program. After each player enters his program, he is asked to specify which instruction he wishes execution to commence with; in response to the question, enter the number of the instruction you wish to execute first.

When both players have finished, you will be asked to enter the number of turns of execution — i.e. how many instructions the computer is going to execute from each program before it announces a draw.

When both players have entered their code, it is assembled. If an error such as an illegal instruction or format is encountered, the appropriate player has to re-input his code. Assuming no errors are present in either program, however, the game starts in earnest.

This is where I made a major change to the game as I discovered it. Apart from the fact that the original game had no assembler, and the code had to be put together by hand, I have stuck to the original guidelines. But the game as it stood wasn't exactly visual — each player typed in a mass of numbers, sat back and waited. This was all very well in the early days, but now people expect something more in the way of a display.

Semi-graphic display

So to that end, I added a semi-graphic display, which takes the form of an array of graphic blocks, 20 blocks wide by 10 high. Each block represents 15 locations in the core, numbered across the screen, so the top left hand block represents locations 0-14, the top right hand locations 295-299, the bottom left 2700-2714, and the bottom right 2985-2999. When the game starts, the area occupied by player one's code is shown in red, and that occupied by player two's in green.

This is the first time either player can know where their code is in memory. After that, whenever a player's program changes the contents of a location in the core, the block representing that location changes to the appropriate colour, so, if a program is overwriting areas of memory as an attack, it is possible to see how close the attack is to a vital point.

The game ends when one program or the other tries to execute an illegal instruction, or when the set number of turns has elapsed.

```
650STA qover
660LDA PC+1
670STA &71
680JSR convert
690LDA &72
700STA current
710LDA &73
720STA current+1
730LDY #0
740LDA #48
750AND (current),Y
760CMP #32
770BNE nn
780LDA #2
790.nh CMP #15
800BNE nl
810LDA #1
820.nl STA mode
830LDA #192
840AND (current),Y
850CMP #128
860BNE nh1
870LDA #2
880.nh1 CMP #54
890BNE nl1
900LDA #1
910.nl1 STA mode+1
920LDA (current),Y
930AND #15
940CMP #1
950BCC end2
960CMP #5
970BCS end2
980LDX #0
990LDY #1
1000.rep LDA mode,X
1010CMP #1
1020BNE nd
1030JSR get
1040JMP finish
1050.end2 LDA #1
1060STA qover
1070RTS
1080.nd CMP #2
1090BNE imm
1100JSR get
1110LDA argL,X
1120STA &70
1130LDA argH,X
1140STA &71
1150JSR convert
1160LDA &72
1170STA data
1180LDA &73
1190STA data+1
1200JSR getbyte
1210LDA data
1220CLC
1230ADC PC
1240STA argL,X
1250LDA data+1
1260ADC PC+1
1270STA argH,X
1280JSR sizeck
1290.finish CPX #1
1300BEQ exec
1310LDY #2
1320INX
1330JMP rep
1340.imm LDA (current),Y
1350STA argL,X
1360TYA:PHA
```

(continued on next page)

(continued from previous page)

```
1370LDY #3
1380LDA (current),Y
1390AND mask,X
1400STA argH,X
1410PLA:TAY
1420JMP finish
1430.exec LDY #0
1440LDA (current),Y
1450AND #15
1460STA &74
1470CLC
1480ADC &74
1490TAX
1500LDA table,X
1510STA &74
1520INX
1530LDA table,X
1540STA &75
1550JMP (&74)
1560.sizeck LDA argH,X
1570CMP #11
1580BCC clr
1590BNE nce
1600LDA argL,X
1610CMP #105
1620BCC clr
1630.nce LDA argL,X
1640SEC
1650SBC #184
1660STA argL,X
1670LDA argH,X
1680SBC #11
1690STA argH,X
1700.clr RTS
1710.getarg LDA mode,X
1720CMP #0
1730BEQ transfer
1740LDA argL,X
1750STA &70
1760LDA argH,X
1770STA &71
1780JSR convert
1790LDA &72
1800STA data
1810LDA &73
1820STA data+1
1830JSR getbyte
1840LDA data
1850STA argL,X
1860LDA data+1
1870STA argH,X
1880.transfer RTS
1890.inc INC PC
1900BNE return
1910INC PC+1
1920.return LDA PC
1930CMP #185
1940BNE rt
1950LDA PC+1
1960CMP #11
1970BNE rt
1980LDA #0
1990STA PC
2000STA PC+1
2010.rt RTS
2020.zp LDA argL,X
2030STA &70
2040LDA argH,X
2050STA &71
2060JSR convert
2070CPX #0
2080BNE high
2090LDA &72
2100STA &74
2110LDA &73
2120STA &75
2130RTS
2140.high LDA &72
2150STA &76
2160LDA &73
2170STA &77
2180RTS
2190.mov LDA mode
2200BEQ immd
2210LDX #0
2220JSR zp
2230INX
2240JSR zp
2250LDY #0
2260.agn2 LDA (&74),Y
2270STA (&76),Y
2280INY
2290CPY #4
2300BNE agn2
2310JSR inc
2320INC flag
2330RTS
2340.immd LDX #1
2350JSR zp
2360LDY #0
2370TYA
2380.agn3 STA (&76),Y
2390INY
2400CPY #2
2410BNE agn3
2420LDA argL
2430STA (&76),Y
2440INY
2450LDA argH
2460STA (&76),Y
2470JSR inc
2480INC flag
2490RTS
2500.add LDX #0
2510JSR getarg
2520INX
2530JSR zp
2540JSR getarg
2550CLC
2560LDA argL
2570ADC argL+1
2580STA argL
2590LDA argH
2600ADC argH+1
2610STA argH
2620LDX #0
2630JSR sizeck
2640.thn LDA argL
2650LDY #2
2660STA (&76),Y
2670INY
2680LDA argH
2690STA (&76),Y
2700JSR inc
2710INC flag
2720RTS
2730.sub LDX #0
2740JSR getarg
2750LDX #1
2760JSR zp
2770JSR getarg
2780SEC
2790LDA argL+1
2800SBC argL
2810STA argL
2820LDA argH+1
2830SBC argH
2840STA argH:LDX #0
2850JSR sizeck1
2860JMP thn
2870.sizeck1 LDA argH,X
2880CMP #11
2890BCC clr1
2900BNE ncel
2910LDA argL,X
2920CMP #185
2930BCC clr1
2940.ncel LDA argL,X
2950CLC
2960ADC #184
2970STA argL,X
2980LDA argH,X
2990ADC #11
3000STA argH,X
3010.clr1 RTS
3020.jmp LDA argL
3030STA PC
3040LDA argH
3050STA PC+1
3060RTS
3070.jmz LDX #1
3080JSR getarg
3090.jm LDA argL+1
3100BNE ret2
3110LDA argH+1
3120BNE ret2
3130JMP jmp
3140.ret2 JSR inc
3150RTS
3160.jmg LDX #1
3170JSR getarg
3180LDA argL,X
3190BNE jmp
3200LDA argH,X
3210BNE jmp
3220JMP ret2
3230.djz LDX #1
3240JSR zp
3250JSR getarg
3260LDA argL+1
3270SEC
3280SBC #1
3290STA argL+1
3300LDA argH+1
3310SBC #0
3320STA argH+1
3330JSR sizeck1:LDY #2
3340LDA argL+1
3350STA (&72),Y
3360INY
3370LDA argH+1
3380STA (&72),Y
3390LDA &72
3400STA &76
3410LDA &73
3420STA &77
3430INC flag
3440JMP jm
3450.cmp LDX #0
3460JSR getarg
3470INX
3480JSR getarg
3490LDA argL
3500CMP argL+1
3510BNE skip
3520LDA argH
3530CMP argH+1
3540BNE skip
3550JSR inc
3560RTS
3570.skip JSR inc
3580JSR inc
3590RTS
3600.display LDA #0
3610STA row
3620STA col
3630LDA #(HIMEM+160) MOD
256
3640STA &80
3650LDA #(HIMEM+160) DIV
256
3660STA &81
3670LDY #0
3680.agn LDA #150
3690STA (&80),Y
3700JSR incl
3710LDA #255
3720STA (&80),Y
3730JSR incl
3740LDA col
3750CMP #19
3760BEQ nrow
3770CLC
3780ADC #1
3790STA col
3800JMP agn
3810.nrow LDA #0
3820STA col
3830LDA row
3840CMP #18
3850BCS end
3860CLC:ADC #2
3870STA row
3880LDA &80
3890CLC
3900ADC #40
3910STA &80
3920LDA &81
3930ADC #0
3940STA &81
3950JMP agn
3960.end RTS
3970.incl LDA &80
3980CLC
3990ADC #1
4000STA &80
4010LDA &81
4020ADC #0
4030STA &81
4040RTS
4050]:NEXT LL
4060PROCinit
4070MODE 7:PROCgame:GOTO 4070
4080DEFPROCgame
4090error%=0:M$=CHR$132+CHR$157+CHR$141+CHR$131
4100FOR I=0 TO 1:PRINT M$;TAB(15);"CoreWars":NEXT
4110PRINT'':FOR I=0 TO 1:PRINTTAB(8);CHR$141;CHR$129
;"(C) JCC '85":NEXT
4120PROCspace
4130PROCmain:ENDPROC
4140DEFPROCmain
4150FOR Z%=0 TO 1:PROCinput(Z%):NEXT
4160PC(0)=PC(0)+ad(0):PC(1)=PC(1)+ad(1)
4170FOR Z%=0 TO 1:PROCassemble(Z%)
4180IF error%=0 PRINT''CHR$136;"No errors.":PROCspace
:GOTO 4200
4190PROCerror:PROCinput(Z%):PROCassemble(Z%):GOTO 418
0
4200NEXT Z%
4210VDU 23;8202;0;0;0;
4220CLS:FOR I=1 TO 2:PRINTM$;TAB(5);"Phase 3- Redcode
simulation":NEXT
4230CALL display
4240FOR Q%=0 TO 1
4250FOR R%=ad(Q%) TO ad(Q%)+E(Q%) STEP 15
4260?FNpos(R%)=(145+Q%)
4270NEXT R%:NEXT Q%
4280FOR J=0 TO E%-1:FOR I=0 TO 1
4290?PC=PC(I) MOD 256:PC?1=PC(I) DIV 256
4300CALL start:PC(I)=?PC+256*PC?1
4310IF ?gover=1 CLS:FOR Z%=0 TO 1:PRINTTAB(1,Z%+12);
CHR$141+CHR$130;"Player ";(I EOR 1)+1;" wins":NEXT:VDU
7:PROCspace:ENDPROC
4320IF ?flag=0 GOTO 4350
4330A%=((?&76+256*?&77)-base) DIV 4
4340?FNpos(A%)=(145-I)
4350NEXT I:NEXT J:CLS:FOR I=0 TO 1:PRINTTAB(14,I+12);
CHR$141+CHR$129;"Draw!":NEXT:VDU 7:PROCspace:ENDPROC
4360DEFPROCinit
4370FOR I=0 TO 8:READ IN$(I):NEXT
4380FOR I=1 TO 8:L=EVAL IN$(I):?(I*2+table)=L MOD 256
:?(I*2+table+1)=L DIV 256:NEXT
4390FOR I=0 TO 8:READ t(I):NEXT
4400ENDPROC
4410DEFPROCinput(p)
4420CLS:FOR I=1 TO 2:PRINTM$;TAB(5);"Phase 1- Redcode
entry":NEXT
4430PRINT:FOR I=1 TO 2:PRINTTAB(14);CHR$141;CHR$129;"
Player ";(p+1):NEXT
4440c=0:VDU 28,0,24,39,5
4450REPEAT:PRINTTAB(0);c;" ";
4460INPUT LINE "" p$:X$=""
4470IF p$="" E(p)=c-1:GOTO 4560
4480FOR I=1 TO LEN(p$)
4490D$=MID$(p$,I,1):IF D$=" " GOTO 4530
4500D=ASC(D$)
4510IF D$<"A" OR D$>"Z" X$=X$+D$:GOTO 4530
4520X$=X$+CHR$(D+32)
4530NEXT I:p$(p,c)=X$
4540c=c+1:IF c<100 GOTO 4560
4550UNTIL FALSE
4560IF error%=1 GOTO 4630 ELSE I=p:CLS:PRINT''
4570PRINT"Start instruction player ";I+1;
4580INPUT PC(I)
4590ad(0)=RND(1500):ad(1)=ad(0)+500+RND(200)
4600IF I=0 GOTO 4630
4610CLS:PRINT'''':INPUT "How many turns ",E%
4620IF E%<100 GOTO 4610
4630VDU 26:ENDPROC
4640DEFPROCassemble(p)
4650CLS:FOR I=1 TO 2:PRINTM$;TAB(5);"Phase 2.";(p+1);
"- Redcode assembly":NEXT
4660ad=ad(p)
4670FOR c=0 TO E(p)
4680A$=LEFT$(p$(p,c),3)
4690FOR I=0 TO 8
4700IF A$=IN$(I) GOTO 4720
4710NEXT I:PRINT'''"Invalid instruction - ";A$:error
%=1:ENDPROC
4720a=ad*12 MOD 3000:byte=0
4730B$(2)=RIGHT$(p$(p,c),LEN(p$(p,c))-3):B$(1)="":IF
I=0 B$(1)=B$(2):B$(0)=""
4740IF I?argl GOTO 4790
4750X%=INSTR(p$(p,c),",")
4760IF X%=0 PRINT"Invalid argument":error%=1:ENDPROC
4770B$(0)=MID$(p$(p,c),4,(X%-4))
4780B$(1)=RIGHT$(p$(p,c),LEN(p$(p,c))-X%))
4790FOR Q%=0 TO 1
4800IF LEFT$(B$(Q%),1)="#" GOTO 4830
4810IF LEFT$(B$(Q%),1)="@" byte=byte+32*Q%+16:GOTO 48
30
4820byte=byte+16*Q%+48:GOTO 4840
4830B$(Q%)=RIGHT$(B$(Q%),LEN(B$(Q%))-1)
4840NEXT Q%
4850addr=ad*4+base
4860?addr=(I+byte)
4870B%=VAL(B$(2)) MOD 3000
4880IF B%<0 B%=B%+3000:GOTO 4880
4890C%=VAL(B$(1)) MOD 3000
4900IF C%<0 C%=C%+3000:GOTO 4900
4910addr?1=B% MOD 256
4920addr?2=C% MOD 256:IF I=0 addr?3=C% DIV 256:GOTO 4
940
4930addr?3=(B% DIV 256*(C% DIV 256)*16)
4940ad=ad+1:NEXT c
4950error%=0:ENDPROC
4960DEFPROCspace
4970VDU 23;8202;0;0;0;:PRINTTAB(10,23);CHR$136;CHR$12
9;"Press space bar"
4980A=GET:VDU 23;&720A;0;0;0;:ENDPROC
4990DEFFNpos(A)=(A DIV 300)*100+(A DIV 15)MOD 20)+2+H
IMEM+150
5000DATA dat,mov,add,sub,jmz,jmz,jmg,djz,cmp
5010DATA 1,2,2,2,1,2,2,2,2
```

CBM ROCK F

Listing 2.

```
0 REM********************************
1 REM*******BY PAUL HAMMOND 19.5.85*****
2 REM********************************
10 REM***********SET UP SCREEN***********
12 PRINT"[illegible]":POKE53281,0:POKE53280,0
20 POKE53272,28:POKE53270,PEEK(53270)OR16
30 POKE53283,1:POKE53282,5
35 DIMS$(10,12)
40 REM*************VARIABLES************
50 M$(1)="[illegible]":M$(2)="[illegible]":U$="[illegible]"
60 F$="[illegible]"
62 W$="[illegible]"
64 G$="[illegible]"
65 D$="[illegible]"
67 LE=1:GOTO800
68 SC=0:SC$="000000":LI=3
70 FORI=1TO10:FORT=1TO11:READS$(I,T):NEXTT:NEXTI
90 POKE53282,5:GOSUB1000
95 X=3:Y=2:D=0
110 PRINTLEFT$(U$,Y)SPC(X)M$(1)
120 REM***********SET UP SOUND***********
130 FORI=54272TO54296:POKEI,0:NEXT
140 POKE54278,120:POKE54277,9:POKE54276,17
150 POKE53265,PEEK(53265)OR16
200 REM*************MOVE MAN*************
210 SYS49152:SYS49152
214 A=PEEK(1024+X+Y*40-80):IFA=63ANDM=2THEN500
216 PE=PEEK(197):P=0
220 IFPE=45THENP=-2
230 IFPE=50THENP=2
240 IFPE=13THENP=-80
250 IFPE=23THENP=80
255 IFPE=4THEN520
260 IFP=0THEN320
280 A=PEEK(1024+X+Y*40+P):IFA=32ORA=71ORA=67THEN290
285 GOTO320
290 PRINTLEFT$(U$,Y)SPC(X)"[illegible]":M=0:P=1
300 IFP=2ORP=-2THENX=X+P
305 IFP=80THENY=Y+2
306 IFP=-80THENY=Y-2
307 IFY<2THENY=2
312 IFA=67THEND=D+1:GOSUB600:IFD=14THENLE=LE+1:SC=SC+420:GOTO700
320 PRINTLEFT$(U$,Y)SPC(X)M$(F):M=M+1
325 IFF=1ANDM>5THENF=2:GOTO330
326 F=1
330 GOTO200
500 REM************DEAD MAN************
510 PRINTLEFT$(U$,Y)SPC(X)"[illegible]":SYS49152:SYS49152
520 POKE54296,15:POKE54276,17:FORI=0TO255STEP20:POKE54273,I:NEXT
530 FORI=255TO0STEP-15:POKE54273,I:NEXT
540 POKE54276,0
550 LI=LI-1:IFLI=0THEN800:REM**TITLE**
560 GOTO90
599 END
600 REM*******SOUND FOR DIAMOND*******
605 PRINTLEFT$(U$,Y)SPC(X)M$(1)
610 POKE54276,17:POKE54296,15:FORI=250TO0STEP-35:POKE54273,I:NEXT:POKE54276,0
615 SC=SC+275:POKE54273,0
620 A$=MID$(STR$(SC),2,LEN(STR$(SC))):SC$=LEFT$("000000",6-LEN(A$))+A$
625 PRINT"[illegible]"SPC(19);SC$
630 RETURN
700 REM*************NEW LEVEL***********
710 POKE54276,17:FORI=0TO5STEP.2:POKE53281,I*5:POKE54273,I:NEXT:POKE54276,0
730 GOTO90
800 REM************TITLE PAGE***********
805 PRINT"[illegible]"
810 PRINT"[illegible]"
811 PRINT"[illegible]"
812 PRINT"[illegible]"
813 PRINT"[illegible]"
814 PRINT"[illegible]"
815 PRINT"[illegible]"
816 PRINT"[illegible]"
817 PRINT"[illegible]"
818 PRINT"[illegible]"
819 PRINT"[illegible]"
820 PRINT"[illegible]"
821 PRINT"[illegible]"
822 PRINT"[illegible]"
823 PRINT"[illegible]"
824 PRINT"[illegible]"
825 PRINT"[illegible]"
826 PRINT"[illegible]"
827 PRINT"[illegible]"
828 PRINT"[illegible]"
829 PRINT"[illegible]"
830 PRINT"[illegible]"
831 PRINT"[illegible]"
832 PRINT"[illegible]":LE=1
833 PRINT"[illegible]          START AT SCREEN"LE
840 POKE198,0
850 GETA$:IFA$=""THEN850
851 IFA$=" "THEN855
852 LE=LE+1:IFLE=9THENLE=1
853 GOTO833
855 RESTORE
860 FORI=0TO25:SYS49152:FORT=0TO20:NEXT:NEXT:GOTO68
999 END
1000 REM***********DRAW SCREEN***********
1001 IFLE=11THENLE=1:SC=SC+600
1005 PRINT"[illegible]"
1010 FORI=1TO11:PRINT:PRINT"[illegible]";:FORT=1TO13
1020 A$=MID$(S$(LE,I),T,1)
1030 IFA$="[illegible]"THENPRINTR$;
1040 IFA$="[illegible]"THENPRINTW$;
1050 IFA$="[illegible]"THENPRINTG$;
1060 IFA$="[illegible]"THENPRINTD$;
1080 NEXTT:NEXTI
1090 PRINT:PRINT"[illegible]————————————————————"
1092 PRINT"————————————————————[illegible]"
1100 A$=MID$(STR$(SC),2,LEN(STR$(SC))):SC$=LEFT$("000000",6-LEN(A$))+A$
1110 PRINT"[illegible]"SPC(13)"SCORE ";SC$ TAB(33)"MEN";LI;"SHEET";LE
1200 RETURN
10000 REM********DATA FOR SCREENS*******
10010 DATAWGGGGGGWGGGGGGGGW,WGGGWRRRGRRRRWGGGW
10011 DATAWGGGWGGGGGGGWRGGGW,WGGGRGWGGGGGDRGGGW,WGGGGGWGGGGRWGRGGGW
10012 DATAWGRGRGWDDWGGRGGGW,WGGGWRGWWWDRGRGRGW,WRGGGRGWDDWGGRGGGW
10013 DATAWGRGGWGRDRGWGGGGW,WGGGWWRRRRWRWGGRGW,WGRGWGGDRGRDGGWGGW
10014 DATAWRWWRGGDDGGRGGRW
10020 DATAWGGGRGRGGGRGGGGGRW,WGGGGGGGRGGRGGRRGW,WGGGGRWWWDDWWWDW
10021 DATAWGGDGWDWRGGGGRGRWGW,WDGGWGWDGRGRGGDWGW,WGGGGWGWDWWGGWWWGW
10022 DATAWRRRGWGWGWRGGRWGWRW,WRDRAWGWRWGGWGWGWGW,WRRRGWDGWGDDWGWGW
10023 DATAWGDGGGRGGWGWWGWGGGW,WGGGGGGGGGGGGWGGGGW
```

Listing 1.

```
10 REM****ROCK FALL M/C AND GRAPHICS***
500 AD=12288:I=0
510 READA:IFA=-1THEN600
520 POKEAD+I,A:I=I+1:GOTO510
600 AD=49152:I=0
610 READA:IFA=-1THEN5000
620 POKEAD+I,A:I=I+1:GOTO610
1000 DATA60,102,110,110,96,98,60,0,24,60,102,126,102,102,102,0
1001 DATA124,102,102,124,102,102,124,0,60,102,96,96,96,102,60,0
1002 DATA120,108,102,102,102,108,120,0,126,96,96,120,96,96,126,0
1003 DATA126,96,96,120,96,96,96,0,60,102,96,110,102,102,60,0
1004 DATA102,102,102,126,102,102,102,0,60,24,24,24,24,24,60,0
1005 DATA30,12,12,12,12,108,56,0,102,108,120,112,120,108,102,0
1006 DATA96,96,96,96,96,96,126,0,99,119,127,107,99,99,99,0
1007 DATA102,118,126,126,110,102,102,0,60,102,102,102,102,102,60,0
1008 DATA124,102,102,124,96,96,96,0,60,102,102,102,102,60,14,0
1009 DATA124,102,102,124,120,108,102,0,60,102,96,60,6,102,60,0
1010 DATA126,24,24,24,24,24,24,0,102,102,102,102,102,102,60,0
1011 DATA102,102,102,102,102,60,24,0,99,99,99,107,127,119,99,0
1012 DATA102,102,60,24,60,102,102,0,102,102,102,60,24,24,24,0
1013 DATA126,6,12,24,48,96,126,0,60,48,48,48,48,48,60,0
1014 DATA12,18,48,124,48,98,252,0,60,12,12,12,12,12,60,0
1015 DATA0,24,60,126,24,24,24,24,0,16,48,127,127,48,16,0
1016 DATA0,0,0,0,0,0,0,0,24,24,24,24,0,0,24,0
1017 DATA102,102,102,0,0,0,0,0,102,102,255,102,255,102,102,0
1018 DATA24,62,96,60,6,124,24,0,98,102,12,24,48,102,70,0
1019 DATA60,102,60,56,103,102,63,0,6,12,24,0,0,0,0,0
1020 DATA12,24,48,48,48,24,12,0,48,24,12,12,12,24,48,0
1021 DATA0,102,60,255,60,102,0,0,0,24,24,126,24,24,0,0
1022 DATA0,0,0,0,0,24,24,48,0,0,0,126,0,0,0,0
1023 DATA0,0,0,0,0,24,24,0,0,3,6,12,24,48,96,0
1024 DATA60,102,110,118,102,102,60,0,24,24,56,24,24,24,126,0
1025 DATA60,102,6,12,48,96,126,0,60,102,6,28,6,102,60,0
1026 DATA6,14,30,102,127,6,6,0,126,96,124,6,6,102,60,0
1027 DATA60,102,96,124,102,102,60,0,126,102,12,24,24,24,24,0
1028 DATA60,102,102,60,102,102,60,0,60,102,102,62,6,102,60,0
1029 DATA0,0,24,0,0,24,0,0,0,0,24,0,0,24,24,48
1030 DATA14,24,48,96,48,24,14,0,0,0,126,0,126,0,0,0
1031 DATA11,[illegible],47,175,189,189,191,191,189,175,45,45,47,11,11,2
1032 DATA128,160,232,248,250,[illegible],126,94,94,126,126,122,248,232,224,160
1033 DATA5,3,15,13,61,53,246,214,214,246,53,61,13,15,3,3
1034 DATA192,192,240,112,124,92,159,151,151,159,92,124,112,240,192,192
1035 DATA251,251,251,[illegible],[illegible],[illegible],[illegible],170,63,240,255,60,255,255,[illegible],[illegible]
1036 DATA255,255,195,195,195,195,195,195,195,195,195,195,195,195,255,255
1037 DATA195,195,195,195,195,195,195,195,36,60,60,24,126,24,36,102
1038 DATA1[illegible],31,51,63,31,15,3,63,63,3,3,7,14,12,12,28
1039 DATA[illegible],240,204,252,248,240,192,252,252,192,192,224,112,48,48,56
1040 DATA252,192,192,224,112,56,60,24,0,0,0,0,0,0,0,-1
2000 DATA120,0,162,255,189,213,6,201,62,240,12,201,63,210,9,201
2001 DATA51,240,5,201,65,208,25,234,141,0,208,189,253,6,201,32
2002 DATA238,14,169,32,157,213,6,173,0,208,157,253,6,221,234,234
2003 DATA[illegible],234,[illegible],208,207,208,192,4,210,[illegible],[illegible],6,192,208,[illegible],192
2004 DATA[illegible],[illegible],192,[illegible],[illegible],192,[illegible],2,192,[illegible],6,141,[illegible],192,141,[illegible]
2005 DATA132,141,[illegible],192,141,[illegible],192,96,255,255,0,0,255,255,0,0
2006 DATA255,255,0,0,255,255,0,0,255,255,0,0,255,255,0,0,-1
5000 POKE631,[illegible]:POKE632,[illegible]:POKE633,[illegible]:POKE634,[illegible]:POKE635,[illegible]:POKE636,[illegible]
5010 [illegible]
```

```
10030 DATAWGGGGRRRRGRRDRGGGRW
10031 DATAWGGGDRGRGRRGGGGRW
10032 DATAWRGWWWWWWGWWWWWWGGGW
10033 DATAWRGWDRGGGGGGRDWGGGW
10034 DATAWGGWWGGWGGWWRWGGGW
10035 DATAWDGWGGGGGGGGGRWGGGW
10036 DATAWGGWGRGGGGGGGDWGIGW
10037 DATAWGRWGGGGGGGGGGWRIDW
10038 DATAWGRWGGGRDRGGGGGDGRW
10039 DATAWGGWGGRRDRRGGRWRGGW
10040 DATAWGGGGRRRRRRRRRWRGDW
10041 :
10050 DATAWGGRRGGGGGGGGGGGGRW
10051 DATAWGGRGGWWWWWWWWWWGGW
10052 DATAWGGGRWDRGRRRRGGDWDW
10053 DATAWRWGWRGRGGRRGRRRGWW
10054 DATAWDWGGGGDGGDDGRDDGWW
10055 DATAWRWGWGGGGGRRGDGGGWW
10056 DATAWRGGGWGGGRRRRRGGGLDW
10057 DATAWGGRGGWWWWWWWWWWWRRW
10058 DATAWGGRGGGGGGDGRGGGRGW
10059 DATAWGGGGGGGGGDDGGGGGW
10060 DATAWGGGGGGGGGGGGGGGIGW
10061 :
10070 DATAWGGGGGGRRGGGGGGGGW
10071 DATAWGGRGGGGGDRGGRGGRW
10072 DATAWGGGRWWWWWWWWWRGRRW
10073 DATAWGGGRGGGRRGGRGDGGDW
10074 DATAWGGRGGDGGGGDRGGDRGGW
10075 DATAWGGRWWWWWWWWWWWRGGW
10076 DATAWGGGGGGGRDDDRGGGRGGW
10077 DATAWGGDGGGGRRRGGGGDGGW
10078 DATAWGRWWWWWWWWWWWWWRGW
10079 DATAWGRGRGGGRRGGGGGIGW
10080 DATAWGDGGWWWGDGWWWGGIGW
10081
10090 DATAWGGRRDWGGGWWWGGGRRW
10091 DATAWGGRRRWGGWWGWRGGRRW
10092 DATAWGGRRRWGWWDDRGGGGW
10093 DATAWGGRGGWGWGDDDGGGGGW
10094 DATAWGGGRRWWWWWWWWWWGGW
10095 DATAWGGGGDDDDGGDDDGGGW
10096 DATAWGGGGRWWWWWWWWWWWGW
10097 DATAWGGRGRWGGGGGGRGRGW
10098 DATAWRRDGRWGRGGGGRRGRGW
10099 DATAWRDRGWDRRRRRRGGRGW
10100 DATAWRRGGRWGGGGGGGGGGGW
10101 :
10110 DATAWGGGGGGRDGGGRGGGGW
10111 DATAWGGGGGGRDRGGRGGGRW
10112 DATAWGGRWWWWWWWWWWGGRW
10113 DATAWRRGRWRRDGRRDWGGGRW
10114 DATAWDRGRWDDGRRRWGGGGW
10115 DATAWRRGRWGGGGGGDGGGGW
10116 DATAWDRGIWGWWWWGWGGRGW
10117 DATAWIRGIGGWWWWGIGRRGW
10118 DATAWIGWIWWWWWWWWRWRGW
10119 DATAWRGGGGRRWWWRGRGDGW
10120 DATAWGGGGGGGDGGDRGGGGW
10121 :
10130 DATAWGGGGGGGRGGGGGGRGW
10131 DATAWGGGRRRRDRGGGGGRRW
10132 DATAWGGRDGRRRRRGGGGGRW
10133 DATAWGRGRRRRGRGRRRRGRRW
10134 DATAWRDGGGDGGGGGGDGGGGRW
10135 DATAWRGWWWWWGWWWWWWGGW
10136 DATAWRRWGGGGGGGGGRRGWRGW
10137 DATAWRWGGGGGGGGRRRRDGW
10138 DATAWWWRRGWWWGGGRRRRWW
10139 DATAWIGRGGWIGGGGGGGGRW
10140 DATAWGGGGGWIWGGGGIGGGGW
10141 :
10150 DATAWGGGRGRGRIDRGGRRRW
10151 DATAWGGGGRIGGRGGGIIGW
10152 DATAW[illegible]WWWWWWWWWWGWGW
10153 DATAWGWRRRRGDRRWDRGGWGW
10154 DATAWGWDIRGRGRRGRRGRWGW
10155 DATAWGWGGGGGGRRGGGGRWGW
10156 DATAWGWGRRGGGRRRGGGRWGW
10157 DATAWGWGIRRIGRRGRRWGWGW
10158 DATAWGWDRRRAWRRWDRGDWGW
10159 DATAWGWWWWWWDGWWGWWGW
10160 DATAWGGGGGGGGGGGGGGGGGW
10161 :
10170 DATAWGGGGGGGDRGGGGGRGW
10171 DATAWGGGGGGGWWGGGGGRRW
10172 DATAWRRGGGGWRGWGGGGGGW
10173 DATAWRRGGGGWGRGRWGGGGGW
10174 DATAWRRGGGWGRDGDRWRGGGW
10175 DATAWGGRGWGGGDDGGRRRGRRW
10176 DATAWRGRGGWRGRRRRWRRDRW
10177 DATAWGGRGGGWDDDDWDRRRRW
10178 DATAWGWDGGGWRRWGGRRDRW
10179 DATAWGRGGGGGWGGGGGGGW
10180 DATAWGWGGRGGGGGGGGGGGW
10190 REM*********************
```

FALL

Paul Hammond simulates the laws of gravity on the CBM-64.

ROCK FALL IS A game in which you have to guide a little man around 10 caves collecting the 16 diamonds in each. If you burrow under a rock it will fall on you and kill you unless you move out of the way quickly.

During the game you will probably find that you have dropped a rock and it has cut you off from one or more of the diamonds. If this happens press the F1 key to lose a life and the screen will be redrawn. On most of the screens the rocks are placed strategically so that under mining one could block you off or the diamonds off from each other, it could also unblock the way to a diamond.

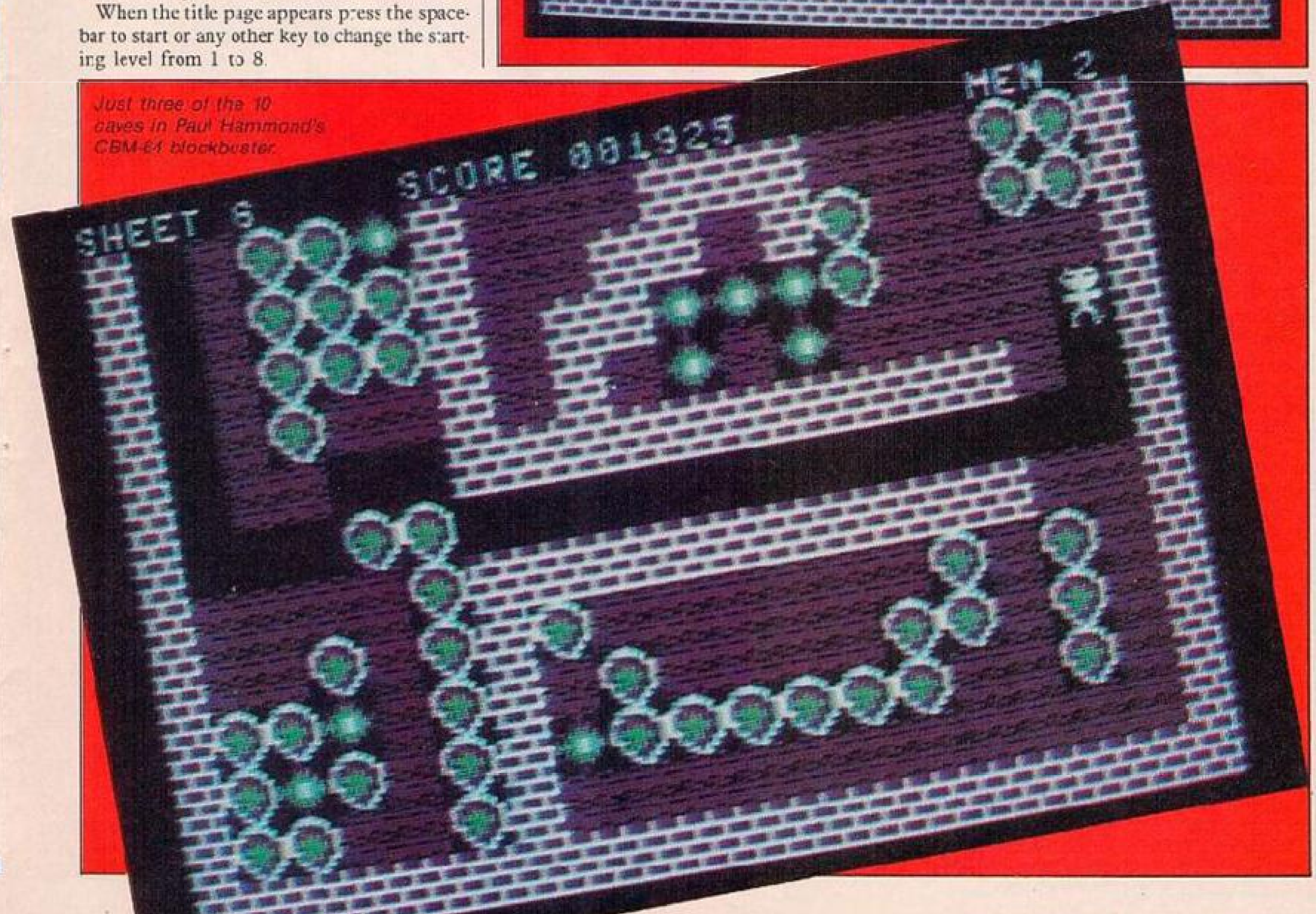
The game is keyboard only and the following keys should be used:

S = Up
X = Down
: = Left
; = Right
F1 = Die

To play the game type in the first program which sets up the machine code and graphics and save it. Next type in the Basic program and save it after the first. Now, when you press Shift and Run/Stop the game should load and run automatically.

When the title page appears press the space-bar to start or any other key to change the starting level from 1 to 8.



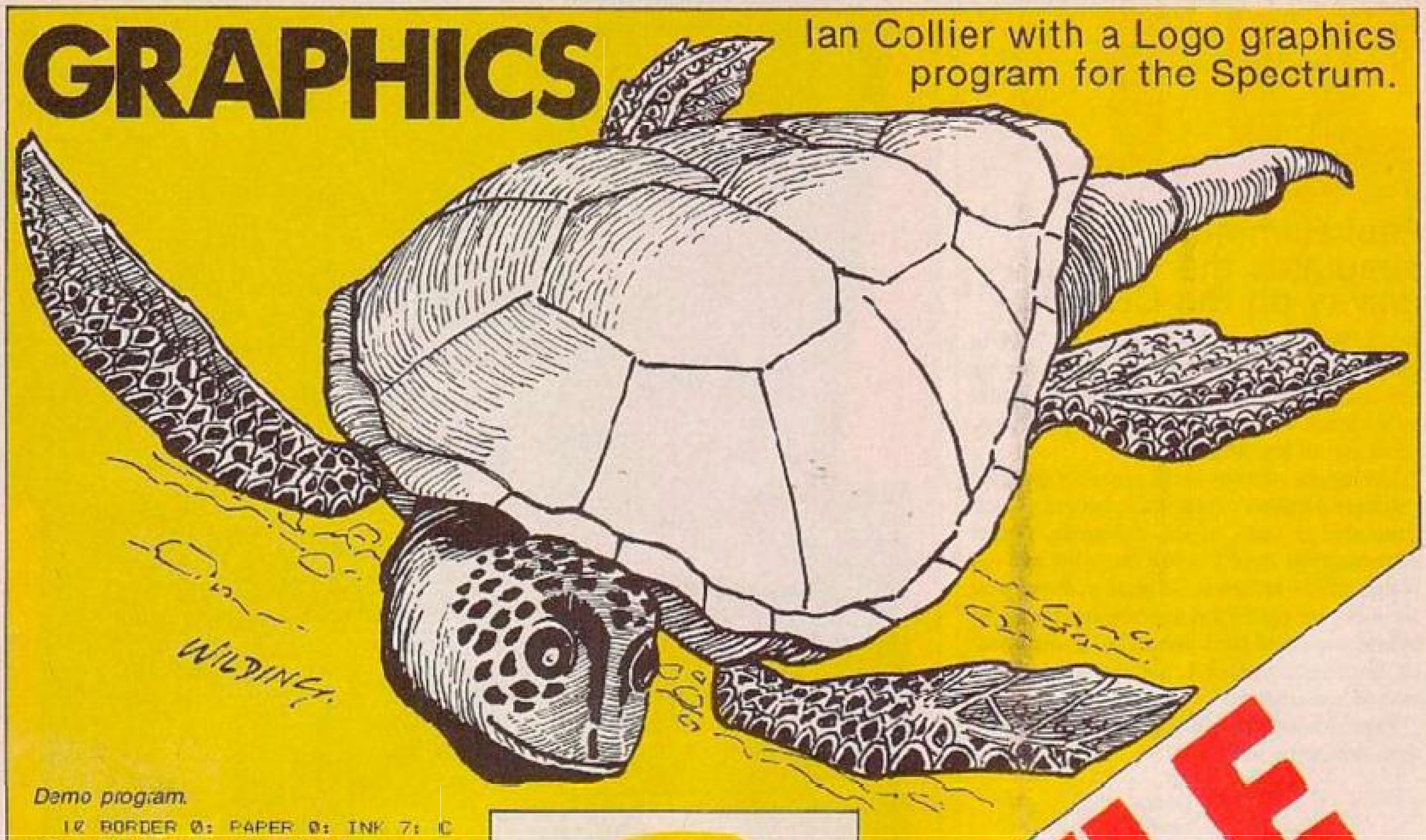


Just three of the 10 caves in Paul Hammond's CBM-64 blockbuster.

GRAPHICS

Ian Collier with a Logo graphics program for the Spectrum.

TURTLE



Demo program.

```
10 BORDER 0: PAPER 0: INK 7: C
LS : RANDOMIZE USR 30000
20"dir0:mov127.87:rep90:for45-
rep/2:rot30:end
30"for44:rot90:for10:fil125.85
.4
40 PAUSE 50:"scr2.0": PAUSE 50
:"scr0.2
50".sta:rep5:fora:rot150:fora:
rot-78:end
60 PAUSE 50: CLS
70"box255 175:mov100.70:pol6.1
40,60
80 LET a=20:"mov130.87:dir5:st
a:fil140.100.2
90"bor2:ink4:cir60
100 INPUT ""
110"mov8 8:dir0:ink6:rep4:rep30
-10*(rep=1 OR rep=3):for4:lum4:e
nd:rot90:end
```



On Telsoft.

THIS IS an implementation of the turtle graphics part of Logo, adapted into about 15 commands.

To set up the machine code the listing of data must be entered and run. The data will be read and Poked in by the Basic program.

After creating the graphics code it should be ready for use at 30000. It may, however, need to be moved, for example to a higher address in a 48K Spectrum. Having saved the code with:

Save "logo"CODE 30000,1600

the relocate program will move the code, first by loading it in at the new address, if this has not already been done, then changing the absolute addresses. A copy of the code at 30000 should be retained for the demonstration program.

Program 1 allows you to use the turtle graphics without writing a program. It incorporates one loop using the control variable c, which can be set up. Commands are as follows:

- DIR x — Points turtle in a direction x degrees anticlockwise from horizontal right.
- CIR x — Draws a circle around the turtle, radius x pixels.
- BOX x,y — Draws a box with two diagonally opposite corners at the turtle and (x,y).

Data loader.

```
10 DEF FN d(a$)=CODE a$-48-(32
AND a$>"Z")-(7 AND a$>"9"): DEF
FN h(a$)=FN d(a$(1))*16+FN d(a$
(2))
20 RESTORE : CLEAR 29999: LET
a=30000
30 FOR x=100 TO 340 STEP 10
40 READ a$: LET t=VAL a$( TO 4
): LET a$=a$(5 TO )
50 POKE a,FN h(a$): LET t=t-PE
EK a: LET a=a+1
60 LET a$=a$(3 TO ): IF a$<>""
THEN GO TO 50
70 IF t THEN PRINT "Error in l
ine ";x: STOP
80 PRINT "Line ";x;" OK": NEXT
x
90 CLS : PRINT AT 10,10;"Finis
hed"
100 DATA "67072a3d5c36dc233675d
f225f5c21d77ae52a535c2b1e22cdAA1
d384be7fe2e2819237ecdb618fe0d2Ee
bfe2220032318e4fe3a20ec23fe2e20e
7225d5c0603d1e7"
110 DATA "6965cbaf121310f9e7eb7
3237223e5cb7ecdb618fe0d28be23fe2
220f37efe3a28b4fe0d20ea18aee1360
031d675225d5ccdb22838172336002
60027774a752336"
120 DATA "54180023360022a5f5c225
d5cc92a4b5ce500010800cd5516e3224
b5ce12336b22336652336f018ce52455
03a595d11cc75d53a3a5cfe0b2013cd1
5762103133cd3025"
130 DATA "7056200421cf12e5c3761
be133a5cfd3600ffcd302528043cc31
3132a5d5c225-5c225b5cc3bd12fd360
0ff2a3d5ce5e5ed733d5ce1cd3275e12
23d5cfdcb007ec0"
140 DATA "670618c7df2b7efe22c28
a1c225d5ccd30252807cd4d0dfd3656f
80f110677e50603e7cbef4f1ab92300c1
310f5c11870e1225d5c131313131310fd1
aa720e1e7fe2e20"
150 DATA "57551ecd3025063a28030
622237ecdb618fe222807fe0d2803b82
0f0225d5c183dcd3025200c0603dffe0
dca8a1ce710f7182b11d77ae50603cba
f4f1ab92007135e7"
160 DATA "742910f5c1180fe1225d5
c1313131310fd1aa720e2cf1Eeb4e23460
3cd407a1812e71ad5cdf576e1235e235
6ebcd3025c42c16cd541fd27b1bdffe0
dc8fe3aca4976fe"
170 DATA "616622c28a1ce7c9a7c84
7c5cd821cfe2c2001e7c110f4c944495
2017c78434952019e78424f5802c8784
64f520102794244520194224649 4c036
677504f4c032379"
180 DATA "5401494e4501f6794a554
d01fe79524f5401177a4d4f56022f7a5
04c4f02377a53435202517a524550016
f7a454e4400807a434140013d7a3e10d
7cd452dd7cd0723"
190 DATA "7043110101 21fe00cd2d7
87cfe203051e60ffe03306 1cd667879 8
34fcd087828e7cb55c0af935f814f7a8
047cd087828 0a79834fcd087820f818c
a21ff0079934fcc"
200 DATA "87370878201 6cd2d787cf
e1038f0c5d5af92573047cd7377d1c11
8df79834f18a4c5e5d5af92573047cd7
```

Relocate program.

```
   1 DEF FN h(a$)=FN d(a$(1))*16
+FN d(a$(2)): DEF FN d(a$)=CODE
a$-48-(32 AND a$)"Z")-(7 AND a$>
"9")
   2 DEF FN a(a)=INT (a/256): DE
F FN b(a)=a-256*INT (a/256): DEF
 FN c(a)=PEEK a+256*PEEK (a+1)
   3 INPUT "New address? ";a: CL
EAR a-1
   4 INPUT "Original address? ";
f: LET t=PEEK 23730+256*PEEK 237
31+1
  10 RESTORE : DIM a(70)
  20 LET a=1
  30 FOR y=1 TO 3
  40 READ a$: LET tot=VAL a$( TO
 4): LET a$=a$(5 TO )
  50 LET l=FN h(a$): LET h=FN h(
a$(3 TO 4))
  60 IF NOT l AND NOT h THEN GO
TO 80
  70 LET tot=tot-h-l: LET a(a)=h
*256+l-30000+t: LET a=a+1: LET a
$=a$(5 TO ): IF a$<>"" THEN GO T
O 50
  80 IF tot THEN PRINT "Error in
 line ";90+10*y: STOP
  90 NEXT y
 100 DATA "51883475377753d759a75a
c75dd75e87525764b76a276ca76d276e
d760a77107716771c7728772e7734773
a77407746774c77"
 110 DATA "57285277587775e7764777
77785778b779b77a377b077b577c477c
877f177fa7706782878337858788778 9
97806791479247 9"
 120 DATA "568627795a79717981798
b799c79ae79bd79c379d279da79e079e
679e9790c7a247a2d7a4a7a737a8f7aa
97a527b00000000"
 135 LET a=t-f
 140 IF PEEK t=42 THEN GO TO 170
 150 PRINT "Insert tape & press
a key": PAUSE 0
 155 CLS
 160 LOAD "logo"CODE t
 170 FOR x=3 TO 70
 180 LET c=FN c(a(x))+a: POKE a(
x),FN b(c): POKE a(x)+1,FN a(c)
 190 NEXT x
 200 LET a=a+PEEK (t+4)-256*PEEK
 (t+7)
 210 POKE t+4,FN b(a): POKE t+7,
FN a(a)
```

FOR x — Moves the turtle forward, leaving a trail.
BOR x — =BORDER x
FIL x,y,z — Fills in any enclosed area in ink z, starting at (x,y). If filling starts at the edge of the area, then it is possible that only half will be filled, so aim for the middle.
POL x,y,z — Draws a polygon with x sides, moving first to (x,y) and going anticlockwise.
INK x — Any further drawing will be in ink x; this only lasts to the end of the line of instructions.
JUM x — Moves the turtle forward x pixels without changing the screen (Jump).
ROT x — Rotates the turtle x degrees anticlockwise.
MOV x,y — Moves the turtle to (x,y).
PLO, x,y — Moves the turtle to (x,y) and plots a pixel.
SCR x,y — Changes the screen colours to paper x and ink y without erasing the patterns.
REP x — Marks the start of a set of instructions to be repeated x times. Also sets up the Basic variable Rep which is equal to the counter of the innermost loop. Note Rep starts at x and goes down to 1.
END — Marks the end of the repeated instructions.

The instructions can be in upper or lower case.

The prompt Instructions will appear and the instructions must be typed in (I have printed out some examples). Then the prompt For a= will appear and you must set up the loop as in Basic by typing three numbers followed by Enter, e.g.

FOR a= 1 TO 50 STEP 1

If a loop is not required, three 1s can be entered.

If a mistake has been entered in the instructions, the program will stop with a report. Otherwise, the instructions will be carried out and you may then enter some more. Each time a set of instructions is entered, the screen is cleared and the turtle is moved to the centre of the screen and pointed horizontally right.

To use the commands in a program they must be initialised. If the code is still in its original position, this is done by:

RANDOMIZE USR 30000

The syntax checker will now accept the new commands, but to use the commands, they must be re-initialised if the program has been altered. This is so that the new position of the variables is recognised, and the new defined procedures are found. The commands need to be initialised after Clear and Run, as these reset the machine stack. If Interface I is connected, this adds complications.

The new commands are regarded by the program as syntax errors unless followed by a turtle graphics command, but they work within a program. Also, when one of the new error reports — e.g. Microdrive not present — is caused, this resets the machine stack and the graphics commands need to be re-initialised.

To enter the new commands, they must be placed inside quotes, but at the end of a line, the final quotes may be omitted. For use in a program, there is one more command — Cal.

It calls instructions at the address given. If these instructions are in a string, the address of the instructions needs to be found and the string needs to be prepared by inserting the hidden floating point forms after the numbers — these will not be hidden in a string and will appear as question marks and other characters. This is done by the routine at 31500 and is demonstrated in program one in lines 145,9510.

New commands are like definable procedures. For an example see the command .sta in the demo program. To define a procedure, open quotes as usual and type a full stop followed by the three-letter name, then a colon. The commands following this will be executed every time the new command is encountered. The end of the defined command is at the first close quotes encountered in the definition, or at the end of the line. ■

Program 1.

```
  10 RANDOMIZE USR 30000
  20 PRINT AT 0,10;"code:";TAB 1
0;
  30 INPUT "Instruction >"; LINE
 a$
  40 LET a=0: FOR x=1 TO LEN a$:
 LET a=a+1: IF a=4 THEN PRINT "
";
  50 IF a$(x)=":" THEN PRINT TAB
 10;: LET a=0: GO TO 70
  60 PRINT a$(x);
  70 NEXT x
  80 INPUT " FOR a=";x1;" TO ";x
2;" STEP ";x3
 140 CLS :"mov128,86:d:r0
 145 LET xx=FN x()
 150 LET a=x1
 160"calxx
 170 LET a=a+x3: IF a<=x2 THEN G
O TO 160
 180 GO TO 20
9500 BORDER 0: PAPER 0: INK 7: C
LEAR 29999: LOAD "logo"CODE : RU
N
9510 DEF FN x()=FN v(USR 31500,a
$): DEF FN v(v)=v
```

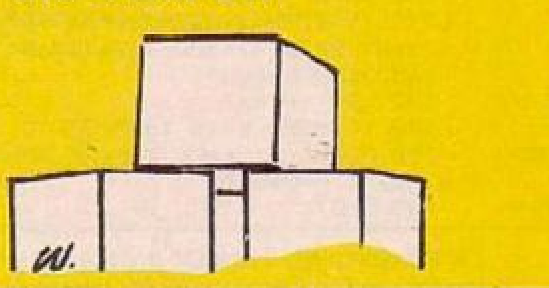
```
377c1e1c17ce60f67cb85188ec5e5d57
88247af935f814f"
 210 DATA "8383cd08787b20f821fe0
0cd7377d1e1c17ce6f067cbcdc373777
93c281b3d281878a72814feaf2810e5c
5cdaa2247047e0710fde601c1e1c9cd6
678af3cc9c5c578"
 220 DATA "91828247cd087887f5adc
b4f280124e6fd6ff1b56f87f6fba56fd
1c1c5d5789247cd0878f5adcb4728047
cc6106 7de6fe6ff1b56fd1c1c9c5d5e
5cdee2247043e01"
 230 DATA "67930f10fdb677cddb0be
1d1c1c9efa3043440b0005a0538 1b97
acdc033ef312001 f0202300 10a00eb1
1be7aedb0c93a7d5ccd282def01383a7
e5ccd282def0138"
 240 DATA "74982a7d5ce55a8f5cf5c
d2d23f1328f5ce1227d5cfd3656f8c9e
fc102383a7d5ccd282def03e1383a7e5
ccd282def0338cd0723c50600cdba24c
1c50e00cdba24c "
 250 DATA "7596c5af9257af935f0a0
0cdba24c10e00c3ba24ef3 3821be7ac
dc033ed53655cef04013821c37acdc03
3ed53655cef0438c3b72421b97a11c07
a010f00edb0efc4"
 260 DATA "638302c502382a7d5ce57
ccd2824e17dcd282cefc3342c0003e50
301e403010524e3e50337a3a30f040f3
811b97acdc033efe5e438cd0723c5ef3
120011f020238eb"
 270 DATA "698411be7a010a00edb0c
12a7d5c7d91c5e5dcf179cd282de1c17
c90dcf179cd282def3104013104 f280
238eb11af7acdc033ef31a3010531 f3
10f0238eb11b47a"
 280 DATA "8030ccc033cdd52d47c5e
f3138eb21af7acdc033cd0279ef31313
8010a00a7ebed42eb21b47aedb0ef0f3
811b97acdc033cd8c78c110d221c87a1
1b97a010f00edb0"
 290 DATA "8672c92f3c2effc93e10d
7cdc52dd7c9fd3656ff21915c7e 5cbc
6cbc6cd0279413 915cfd3656f8c9efa
3043440b0005a053138eb21b97acdc03
3ef0f38c38678cd"
 300 DATA "74730723ed437d5cc9cd0
723c3e522cda22d2a5d5ce50bed435d5
ccd4976e1225d5cc93e10d7cdd52dd73
e11d7cdd52dd73a8f5c2100581101580
1af0277eda0c9cd"
 310 DATA "5265d52d2ada75772a5d5
ce3f511841dc5e9e1c178fe1d2804c5e
5cf00f 3ded5bda75122809d1d5f5c5e
d535d5ce9d1c17afe1d2009f1f5d5ed5
bda7512e9d5e985"
 320 DATA "50813b46736a81060a91c
1377bad2dbd807c1c5aed7e31d0f5498
77bad2dbd307c1c5aed7e31d0f549414
1410e5d000000000000000000000000000
00000000000000"
 330 DATA "3537000000000000000000
000000000000000000000000000000000
0000000e7cdb228da2e1c235e2356e51
77e2323225f5c2bfe0d2806cd02 6233
60de1e5237efe22"
 340 DATA "72072806cd5216233622e
1e523cda7112a5d5c225b5ce1e5225d5
cfdcb30a6fdcb01becd4976 2a5b5c225
d5cfdcb01fe2a5 5c2b2bd1a7ed52eb4
44d722b7303c900"
```

BASIC

Geoff Hatto with a routine to help in the development of a program by storing and executing individual lines of Basic text from within a standard editor. For the CBM-64.



This program is available on Telsoft.





THIS PROGRAM allows individual Basic macros — lines of Basic text — to be stored and executed from within the standard editor. This means that you can define simple one line Basic routines to help in the development of a program. The macros are themselves completely separate from the main program under development.

They are stored in a different area of memory and can be defined, listed, edited and executed using a special set of simple commands. The program also supports an Old command and has two further commands for disc drive owners, a screen directory and command string utility.

The program has been designed to be easy to use and has full error-checking facilities in addition to the standard error routines. The extensions are in the form of single character commands, and all the standard Basic abbreviations are left intact — i.e. L shift, I for List etc.

Up to 10 macros can be defined at any time. Each one can access the main program with a Run or Goto/Gosub statement, but a macro cannot be called from within another macro. Macros only work in direct mode, and therefore cannot be accessed by the main program. Also, the Input and Get commands cannot be included in a macro because they are not direct mode statements.

To define a macro, the letter M is typed followed by the desired macro number — 0 to 9. This is then followed by the Basic text as though you were typing in a standard line in Basic. When return is finally entered, the line is stored in memory ready to be executed.

To run the macro, the letter M is again typed followed by the macro number, but this time with no following text. The macros can then be run — or redefined — as many times as required. To list a macro, the letter L is typed followed by the desired macro number.

After hitting return the macro is listed to the screen preceeded by an M and the macro number. This allows you to directly screen edit the listed macro.

When using Macro 0, the macro number 0 itself need not be specified. Typing M is therefore equivalent to M0. When defining macro 0 like this, a space must be left between the M and the text, otherwise a syntax error will result.

If you execute a macro which causes an error, a message will appear, displaying the error and the macro number. If the error occured in the main program which was called from a macro, then the error will be reported togetyher with the current macro number. Programs executed in the normal way produce standard error messages.

Because this program has been designed as a program development aid, it is relatively crash resistant. Hitting the Run/Stop and Restore keys together have no effect on the extensions and the program can still recover the macro definitions even after a complete power reset — cold start SYS64738 or shorting pins 1 and 3 on the user port — with care! Just type

SYS49152

```
10 REM  ****************************
20 REM  **                        **
30 REM  **  MACRO EDITOR EXTENSION **
40 REM  **  (LOADER)   G.HATTO '85 **
50 REM  **                        **
60 REM  ****************************
70 :
80 READ ADDRESS
90 :
100 BEGIN = ADDRESS
110 MAXNUMBER = 196
120 :
130 DEF FN LINENUMBER(A) = PEEK(63)+PEEK(64)*256
140 :
150 PRINT"▮▮▮  LOADING CODE INTO RAM   PLEASE WAIT."
160 PRINT
170 FOR COUNT=1 TO MAXNUMBER:GOSUB 400 (* READ A DATA
    LINE *) :READ CHECKSUM
180 IF SUM<>CHECKSUM THEN PRINT"CHECKSUM ERROR IN ";FN
    LINENUMBER(0):END
190 L = FN LINENUMBER(0):PRINT L
200 IF ADDRESS<>L+8 THEN PRINT"LINE NUMBER";L;" NOT
    IN ORDER":END
210 NEXT COUNT
220 :
230 :
240 REM SAVE CODE TO DEVICE
250 :
260 REM DEVICE TAPE=1 DISK=8
270 DEVICE = 1
280 :
290 S"S 57812"EDITOR EXTENSION",DEVICE,1
300 :
310 POKE251,BEGIN-INT(BEGIN/256)*256
320 POKE252,INT(BEGIN/256)
330 POKE780,251
340 POKE781,ADDRESS-INT(ADDRESS/256)*256
350 POKE782,INT(ADDRESS/256)
360 :
370 S"S65496:S"S49152:END :(* RUN EDITOR *)
380 :
390 :
400 SUM = 0
410 FOR I=1 TO 8:READ ENTRY$
420 GOSUB 480 :(* CONVERT HEX BYTE *)
430 POKE ADDRESS,ENTRY
440 ADDRESS = ADDRESS+1:SUM = SUM+ENTRY
450 NEXT I
460 RETURN
470 :
480 IF LEN(ENTRY$)<>2 THEN 570
490 A$ = RIGHT$(ENTRY$,1):GOSUB 530:ENTRY = V
500 A$ = LEFT$(ENTRY$,1):GOSUB 530:ENTRY = ENTRY+V*16
510 RETURN
520 :
530 IF A$<"0" OR A$>"F" OR (A$>"9" AND A$<"A") THEN 570
540 V = ASC(A$)-48-7*(A$>"9")
550 RETURN
560 :
570 PRINT"DATA ERROR IN ";FN LINENUMBER(0):END
580 :
590 DATA 49152
600 :
49152 DATA A9,50,A2,C1,8D,02,03,8E,980
49160 DATA 03,03,A9,3B,A0,C1,20,04,735
49168 DATA C1,20,21,C0,20,D0,C0,A9,1051
49176 DATA C0,20,90,FF,30,20,EC,C3,1139
49184 DATA 60,A9,00,20,90,FF,A9,03,873
49192 DATA 8D,B7,C0,20,96,C0,90,15,1056
49200 DATA EE,B7,C0,AD,B7,C0,C9,13,1378
49208 DATA 90,F1,A9,4A,A0,C0,20,04,1016
49216 DATA C1,A9,08,8D,B7,C0,20,B8,1105
49224 DATA C0,60,0D,20,20,4E,4F,20,554
49232 DATA 44,49,53,4B,20,44,45,56,534
49240 DATA 49,43,45,20,46,4F,55,4E,553
49248 DATA 44,20,4F,4E,20,53,45,52,523
49256 DATA 49,41,4C,20,42,55,53,0D,493
49264 DATA 00,0D,20,20,44,49,53,43,376
49272 DATA 20,53,55,50,50,4F,52,54,605
49280 DATA 20,41,55,54,4F,2D,53,45,542
49288 DATA 54,20,54,4F,20,44,45,56,534
49296 DATA 49,43,45,20,23,60,A9,0F,460
49304 DATA AE,B7,C0,A0,0F,20,BA,FF,1197
49312 DATA A9,03,A2,38,A0,C0,20,BD,1091
49320 DATA FF,20,C0,FF,A6,F9,0F,20,958
49328 DATA C3,FF,20,CC,FF,20,60,08,1085
49336 DATA 55,49,20,A9,71,F0,C3,20,867
49344 DATA 04,C1,AE,37,C0,F9,03,20,947
49352 DATA CD,BD,A9,0D,20,D2,FF,60,1169
49360 DATA AD,1B,C6,D0,16,EE,1B,C6,1091
49368 DATA A9,09,8D,1C,C6,EE,1B,C6,1008
49376 DATA 20,7A,C3,20,A6,C3,CE,1C,976
49384 DATA C6,10,F5,60,90,EB,A9,1A,905
49392 DATA A2,C1,8D,00,03,8E,01,03,645
49400 DATA 60,A9,8B,A2,E3,8D,00,03,937
49408 DATA 8E,01,03,60,85,35,84,36,614
49416 DATA A0,00,B1,35,F0,EB,20,D2,883
49424 DATA FF,E6,35,D0,F3,E6,36,D0,1481
49432 DATA EF,60,BA,30,0F,FD,1C,C5,935
49440 DATA 10,0A,A9,2F,A0,C1,20,04,631
49448 DATA C1,20,41,C1,4C,EB,E3,0D,930
49456 DATA 3F,45,52,52,4F,52,20,49,562
49464 DATA 4E,20,4D,41,43,52,4F,20,512
49472 DATA 00,40,0A,40,AD,1C,C6,E3,722
49480 DATA 7F,AA,A9,90,20,CD,BD,A9,1061
49488 DATA 20,20,D2,FF,68,AA,68,60,1003
49496 DATA A9,00,8D,1C,C6,20,68,A5,829
49504 DATA 86,7A,34,7B,20,73,00,AA,820
49512 DATA F0,EE,38,A2,00,20,79,00,801
49520 DATA DD,99,C1,D0,0E,C9,43,F0,1294
49528 DATA 13,A0,31,31,7A,F0,0D,C9,933
49536 DATA 38,90,39,E8,E0,06,D3,E5,1111
49544 DATA 20,4C,30,A4,20,8D,9F,C1,1005
49552 DATA 48,BD,95,C1,48,20,73,00,838
49560 DATA 60,4F,4D,4C,40,24,51,C4,705
49568 DATA C2,C3,C4,C4,C5,14,F9,B0,1424
49576 DATA 6B,C3,E9,93,0D,20,23,42,825
49584 DATA 41,53,49,43,20,4D,41,43,529
49592 DATA 52,4F,20,45,44,49,54,4F,566
49600 DATA 52,20,45,58,54,45,4E,53,585
49608 DATA 49,4F,4E,20,20,47,43,27,476
49616 DATA 30,35,0D,20,20,2D,2D,2D,321
49624 DATA 2D,2D,2D,2D,2D,2D,2D,2D,360
49632 DATA 2D,2D,2D,2D,2D,2D,2D,2D,360
49640 DATA 2D,2D,2D,2D,2D,2D,2D,2D,360
49648 DATA 2D,2D,2D,2D,2D,2D,2D,2D,360
49656 DATA 0D,0D,20,20,45,44,49,54,384
49664 DATA 4F,52,20,43,4F,4D,4D,41,550
49672 DATA 4E,44,53,20,4E,4F,57,20,537
49680 DATA 41,56,41,49,4C,41,42,4C,572
49688 DATA 45,3A,2D,0D,0D,20,20,20,294
49696 DATA 20,20,4F,20,2E,2E,2E,2E,359
49704 DATA 2E,2E,2E,2E,2E,2E,20,4F,387
49712 DATA 4C,44,3D,20,20,20,20,20,317
49720 DATA 4D,2A,5A,2F,54,45,53,54,560
49728 DATA 2E,2E,2E,2E,20,44,45,46,423
49736 DATA 49,4E,45,20,42,41,53,49,539
```

MACRO EDITOR



to recover extensions.

The macro definitions are located in the $C000 block — as is the program — which has no effect on Basic. The macros are actually executed in this block and the only way to corrupt them is to poke into this area.

Typing the letter O followed by return runs an Old command. This recovers Basic text from the current start of Basic. The text can then be treated in the normal way. This is useful after a complete power reset or after typing New. This command, and typing New, have no effect on the macro definitions.

For disc owners, DOS support is provided. When the program is initialised, it scans the serial bus for a disc drive and assigns a matching device number to the program. If no drive is found, a device #8 is assumed — in case you've left the disc drive off! Command strings are sent preceded by the symbol @. Typing just the symbol @ followed by Return displays the current disc error channel. The demonstration disc provided with the drive contains something similar to this.

A screen directory is provided using an $ command which lists the directory contents to the screen instead of the memory, it also shows the number of displayed files listed to the screen.

The command can be issued in the form of a string, i.e.

$:L* =SEQ

would display all files beginning with L that are sequential. See disc drive operating manual for more details on command strings.

The program does not affect the speed of Basic program operation, as it is only active in direct mode. Should you require to load yet another one of the many programs that seem to end up in $C000 then the Q command is provided which turns off the extensions. If you do this by mistake the macros will still be in memory — just re-enter the program.

To get a copy of this program on tape or disc — change line 270 as appropriate — type in the program listed and save it. Now place a blank cassette in the cassette deck or disc in the disc drive and type Run. If all is well, then the program will have saved an executeable copy of the program on tape — or disc. If not, then the reported errors in the Data statements must be corrected and the listing re-saved ready for another attempt.

The program may be reloaded and run when required by typing:

LOAD"EDITOR EXTENSION",1,1 for tape,
LOAD "EDITOR EXTENSION",8,1 for disc,
Execute with

SYS49152

followed by Return. Type New if no Basic program exists, or use the Old command — the letter O and Return — to recover any resident program.

To finish with, here are a few examples of macro definitions to show you how they can be used.

M LIST 2300 — 2450

lists the current set of lines of interest when developing a section of program, in this case from 2300 to 2450.

M1 CLR:PRINT FRE(0)—(FRE(0)<0)*65536;" BYTES FREE"

prints the correct number of free bytes available for a program.

M2 F$="PROGRAMNAME"+STR$(PEEK(252)):
SAVE F$,1:POKE252,(peek(252)+1)AND255

saves the current Basic program called "Programname" to tape with an updated version number. Location 252 contains the current version number.

M3 GOSUB 10: PRINT"VARIABLE 'A' SET TO ";A

If the End statement in the main program is replaced with a Return statement then the whole program can be treated as a subroutine by a macro, in this case displaying the final value of a variable A when the main program starting at line 10 has ended.

M4 OPEN4,4:CMD4:LIST
M5 PRINT # 4:CLOSE4

These two definitions when executed can be used to print a program to a Commodore printer, the second one is used after the printer has stopped, to close the printer channel. ■

```
49744 DATA 43,20,4D,41,43,52,4F,0D,482
49752 DATA 20,20,20,20,20,4D,20,5E,357
49760 DATA 2E,2E,2E,2E,2E,2E,2E,2E,368
49768 DATA 2E,20,45,58,45,43,55,54,543
49776 DATA 45,20,4D,41,43,52,4F,0D,484
49784 DATA 20,20,20,20,20,4C,20,5E,355
49792 DATA 2E,2E,2E,2E,2E,2E,2E,2E,363
49800 DATA 2E,20,4C,49,53,54,20,4D,583
49808 DATA 41,43,52,4F,0D,20,20,20,402
49816 DATA 20,20,40,20,53,54,52,49,402
49824 DATA 4E,47,2E,2E,2E,2E,2E,44,433
49832 DATA 49,53,4B,20,43,4F,4D,4D,563
49840 DATA 41,4E,44,53,0D,20,2E,20,483
49848 DATA 20,20,24,20,53,54,52,49,454
49856 DATA 4E,47,2E,2E,2E,2E,2E,44,433
49864 DATA 49,52,45,43,54,4F,52,59,625
49872 DATA 0D,20,20,20,20,20,51,20,206
49880 DATA 2E,2E,2E,2E,2E,2E,2E,2E,368
49888 DATA 2E,2E,20,51,55,49,54,0D,460
49896 DATA 0D,00,20,79,00,B0,07,20,381
49904 DATA F3,BC,20,AA,B1,60,A2,0B,1079
49912 DATA 4C,3A,F4,03,A2,00,8E,1C,638
49920 DATA C6,20,F0,32,B0,10,C5,30,969
49928 DATA 90,51,29,0F,0D,1C,C6,20,600
49936 DATA 73,00,F0,1E,99,45,AE,04,762
49944 DATA A6,7A,20,79,A5,20,7F,C3,955
49952 DATA 89,00,E2,91,35,F0,05,C8,830
49960 DATA C0,FC,50,F4,20,A6,C5,4C,1301
49968 DATA 74,A4,FD,1C,C6,2C,A5,00,892
49976 DATA 09,80,ED,1C,C6,A9,8E,85,934
49984 DATA 9D,A9,FF,05,3A,20,7F,C3,1121
49992 DATA 38,A5,35,E9,01,85,7F,A5,928
50000 DATA 36,E9,E0,85,73,20,E1,A7,967
50008 DATA 4C,74,F4,A9,67,A0,C5,20,1015
50016 DATA 04,C1,F2,0E,4C,1A,C1,0D,681
50024 DATA 3F,4D,41,43,52,4F,2E,44,533
50032 DATA 45,46,49,4E,49,54,45,4F,599
50040 DATA 4E,00,C0,00,05,35,05,36,620
50048 DATA AD,1C,C6,29,7F,A8,FE,10,991
50056 DATA 18,A5,35,69,53,85,35,A5,773
50064 DATA 36,69,00,85,35,88,DE,F0,938
50072 DATA 18,A9,1D,65,35,85,35,A9,731
50080 DATA C6,65,36,85,36,60,A9,00,805
50088 DATA A2,04,91,35,C0,CA,D0,FA,1224
50096 DATA 60,00,A2,03,8E,1C,C6,20,674
50104 DATA F0,10,E0,53,C9,30,90,4C,981
50112 DATA 29,0F,ED,1C,C6,20,73,00,570
50120 DATA D0,45,A9,F3,A0,C3,20,04,1005
50128 DATA C1,20,41,C1,A9,08,A0,C4,1016
50136 DATA 20,04,C1,20,41,C1,A5,01,689
50144 DATA 85,0F,F0,00,84,49,84,14,665
50152 DATA 84,15,20,7A,C3,A5,35,A6,886
50160 DATA 36,85,5F,86,60,4C,83,A7,758
50168 DATA 0D,4D,41,43,52,4F,20,4C,491
50176 DATA 49,53,54,49,4E,47,20,00,494
50184 DATA 0D,0D,4D,00,A9,0B,2C,A9,496
50192 DATA 0E,AA,4C,1A,C1,A6,2C,A5,854
50200 DATA 2D,05,2D,06,2C,D0,02,C6,809
50208 DATA 2E,C6,2D,A9,02,A0,02,91,767
50216 DATA 2D,20,4E,C4,A9,00,20,54,627
50224 DATA C4,B1,2D,D0,F7,C8,B1,2D,1295
50232 DATA D0,EF,C8,B1,2D,D0,EF,20,1343
50240 DATA 51,C4,20,54,C4,20,33,A5,837
50248 DATA 20,59,A6,4C,74,A4,20,51,756
50256 DATA C4,20,54,C4,E5,2D,D0,02,993
50264 DATA E6,2E,A5,2E,C5,38,D0,04,952
50272 DATA A5,2D,C5,37,B3,01,60,A2,897
50280 DATA 10,4C,37,A4,F3,22,48,AD,838
50288 DATA 37,C0,20,B1,FF,A9,6F,20,1151
50296 DATA 93,FF,A9,60,85,7C,60,20,1050
50304 DATA A8,FF,20,73,00,C9,00,D0,979
50312 DATA F6,20,AE,FF,A9,C9,85,7C,1334
50320 DATA 20,9E,C4,D0,03,4C,74,A4,953
50328 DATA 20,CC,FF,4C,74,A4,A9,00,1016
50336 DATA 85,90,AD,B7,C0,20,B4,FF,1292
50344 DATA 20,B7,FF,D0,15,A9,6F,20,1012
50352 DATA 96,FF,20,A5,FF,24,90,70,1149
50360 DATA 05,20,B2,FF,D0,F4,20,AB,1157
50368 DATA FF,A9,00,60,A5,7A,CA,86,1144
50376 DATA 3B,A6,7B,86,BC,C9,00,F0,1239
50384 DATA 07,20,73,00,C9,00,D0,F9,812
50392 DATA 38,A9,FE,85,9E,A5,7A,E5,1296
50400 DATA EB,85,B7,A9,0D,AE,B7,C0,1234
50408 DATA F0,00,20,BA,FF,A5,B7,A6,1147
50416 DATA EB,A4,BC,20,BD,FF,20,C0,1239
50424 DATA FF,B0,57,A2,0D,20,C6,FF,1170
50432 DATA E0,50,20,CF,FF,20,CF,FF,1244
50440 DATA 20,CC,FF,A9,D1,A0,C5,20,1226
50448 DATA E4,C1,A5,D6,C9,18,D0,05,1014
50456 DATA FD,0D,02,F0,07,20,5D,C5,885
50464 DATA F5,90,D0,08,20,E1,FF,D0,1245
50472 DATA E9,E6,9E,18,A9,0D,20,C3,1054
50480 DATA FF,20,CC,FF,A9,C6,A0,C5,1470
50488 DATA 20,04,C1,A6,9E,E0,C8,90,1121
50496 DATA 02,A2,00,A9,00,20,CD,BD,759
50504 DATA A9,D5,A0,C5,20,04,C1,4C,1044
50512 DATA 74,A4,48,A9,0D,20,C3,FF,1016
50520 DATA 68,38,4C,F9,E0,A2,0D,20,916
50528 DATA C6,FF,20,A3,C5,20,A3,C5,1237
50536 DATA E6,9E,A9,20,20,D2,FF,20,1118
50544 DATA D2,FF,20,D2,FF,20,D2,FF,1459
50552 DATA 20,A3,C5,85,63,20,A3,C5,1016
50560 DATA 85,62,20,D1,BD,A5,20,20,894
50568 DATA D2,FF,20,A3,C5,A2,01,86,1154
50576 DATA D4,C9,00,F3,06,20,D2,FF,1156
50584 DATA 4C,8A,C5,20,CC,FF,A9,0D,1084
50592 DATA 4C,D2,FF,20,CF,FF,A6,90,1345
50600 DATA D0,01,60,63,68,18,4C,2C,657
50608 DATA C5,0D,20,20,53,53,45,20,543
50616 DATA 53,48,49,45,54,20,4B,45,558
50624 DATA 59,20,2D,0D,0D,00,0D,20,237
50632 DATA 20,20,20,54,4F,54,41,4C,484
50640 DATA 20,4F,46,20,00,20,46,49,388
50648 DATA 4C,45,20,53,29,20,44,49,482
50656 DATA 53,50,4C,41,59,45,44,2E,576
50664 DATA 0D,00,A9,83,A2,A4,8D,02,782
50672 DATA 03,8E,03,03,18,20,EC,C0,635
50680 DATA A9,02,A0,C5,20,04,C1,4C,834
50688 DATA 74,A4,0D,45,44,49,54,4F,666
50696 DATA 52,20,45,53,54,45,4E,53,585
50704 DATA 49,4F,4E,53,20,4F,46,46,564
50712 DATA 2E,0D,00,03,00,00,00,00,59
```

TIME B

Join the bomb disposal squad with Chris Turner's Amstrad game.

TIME BOMB will run on an Amstrad CPC-464 in about 9K. The object of the game is to help the hero, Arnold the Anarchist, find his bombs before they blow him up. You can move Arnold up, down, left or right a square at a time, obliterating the square which he has just left or you can slide him left or right, moving the row he is on with him and preserving the underlying square. All this becomes obvious when playing the game.

The time left before the bomb explodes is shown as a burning fuse at the bottom of the screen. If a bomb explodes or if he touches one of the skulls which are spread liberally around the screen, Arnold loses a life. If, however, he completes a sheet, Arnold goes on to the bonus stage. Here you must press the key down when he is above the bomb. If Arnold lands on the bomb bonus points are gained.

There should be no problems typing in the program as there are no long Hex dumps. There are about 160 bytes of machine code, but these are in nice friendly Data statement. These lie between lines 9300 and 9470 and should be very carefully typed in if the code is to work. Also you should bear in mind that Call commands are nasty fellows if the necessary machine code is not there. It may be a good idea to leave the Calls out till the end of your typing, and under no circumstances run a part of the program with a Call in it without first correctly entering and running the program between lines 9300 and 9470. When all has been typed in the program can be saved by just typing in:

SAVE"TIME BOMB"

It's a good idea to Cat it just to be sure all is well. The game can now be loaded and run in the normal way.

If you are interested, the machine code is called by the command:

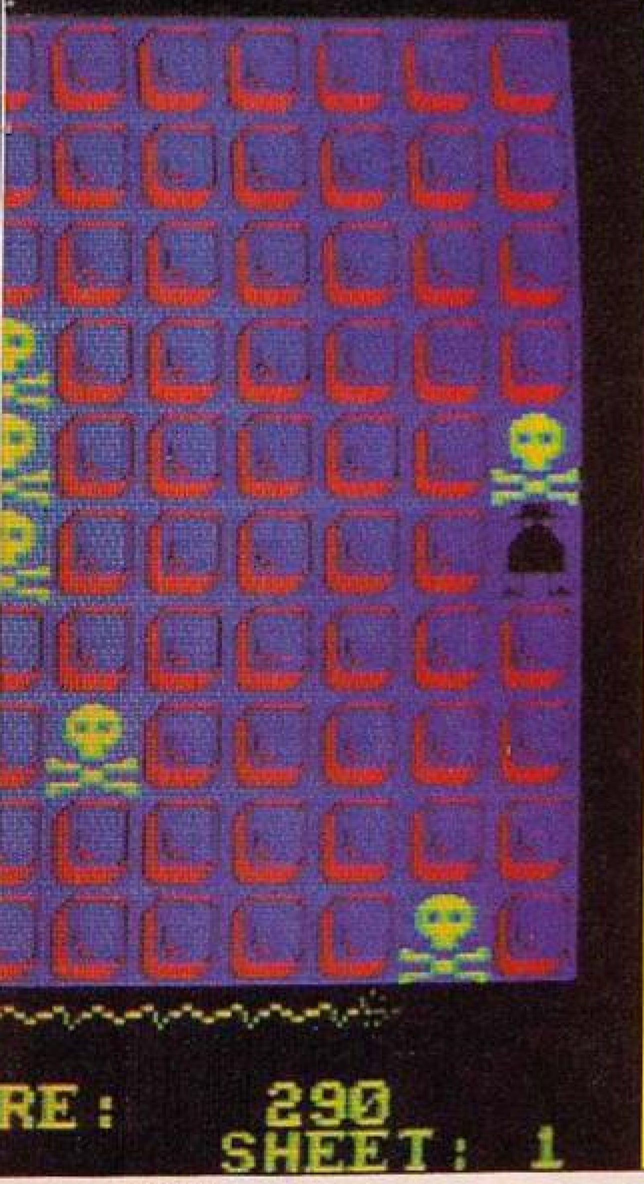
CALL &9000,

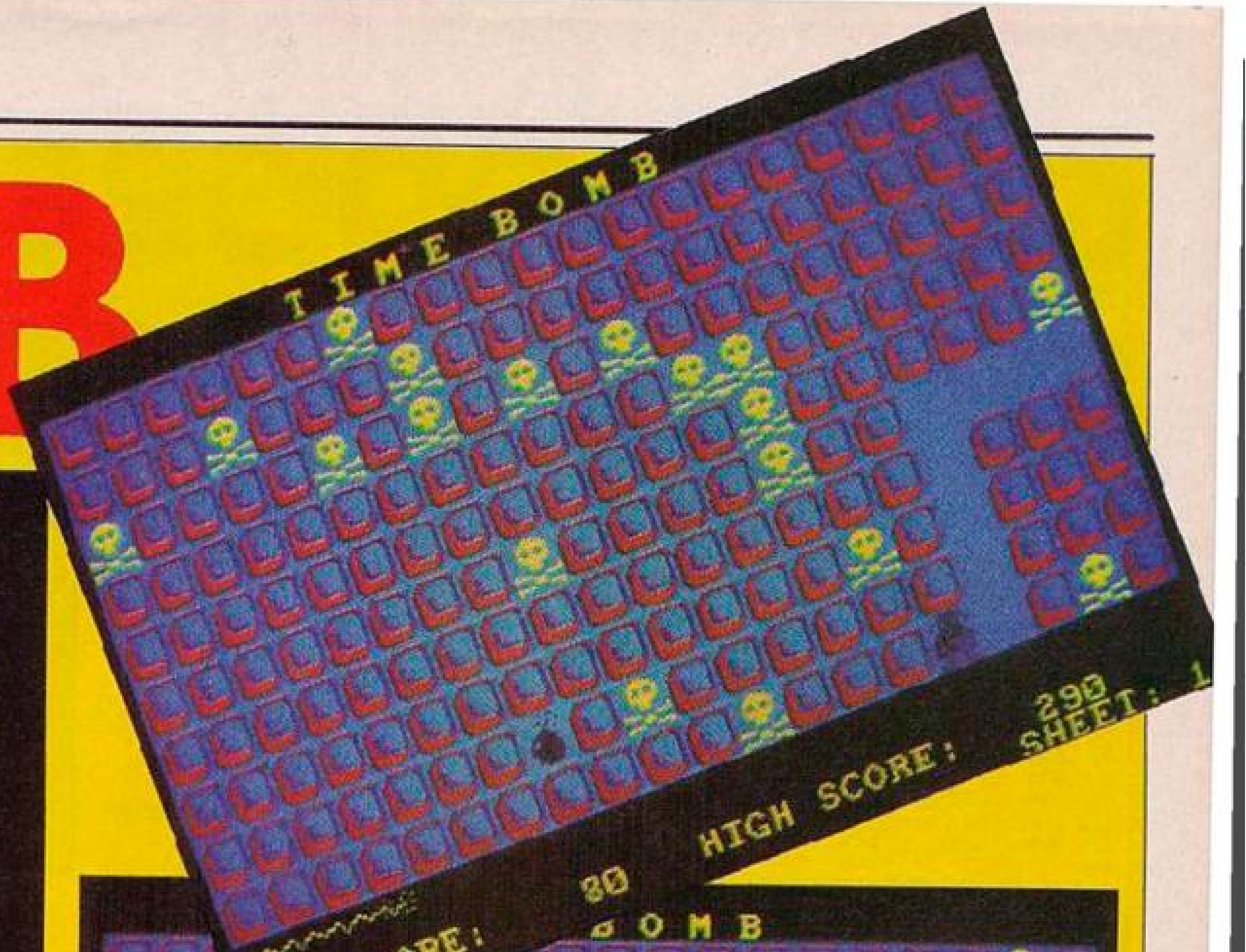
followed by the address of first byte of first line to be scrolled, 1 for left or 2 for right.




```
5 REM
10 REM        T I M E  B O M B
15 REM          by C.Turner
20 REM       for Your Computer
25 REM
30 REM
35 REM
40 REM
45 REM
50 REM
55 REM
60 REM
90 GOSUB 9000
100 GOSUB 5000:GOSUB 7000
110 d=0:GOSUB 1000:IF d=1 THEN 150
120 d=0:GOSUB 2000:IF m=1 THEN 150
135 GOTO 110
150 GOSUB 4000
155 IF sc>hs THEN hs=sc:LOCATE 31,24:PRINT USING"#####
#";hs
160 GOTO 100
1000 REM *move man*
1010 j=JOY(0)
1050 IF INKEY(69)=-1 AND j<>20 THEN 1060
1051 b$(mv)=RIGHT$(b$(mv),19)+LEFT$(b$(mv),1)
1052 FOR i=1 TO 2
1053 CALL &9000,49152+160*(mv),1
1054 CALL &9000,49152+80+160*(mv-1),1
1055 NEXT
1056 mx=mx-1:IF mx=0 THEN mx=20
1057 IF mv=bv THEN bx=bx-1:IF bx=0 THEN bx=20
1058 ft=ft+1
1059 RETURN
1060 IF INKEY(62)=-1 AND j<>24 THEN 1070
1061 b$(mv)=RIGHT$(b$(mv),1)+LEFT$(b$(mv),19)
1062 FOR i=1 TO 2
1063 CALL &9000,49152+160*(mv),2
1064 CALL &9000,49152+80+160*(mv-1),2
1065 NEXT
1066 mx=mx+1:IF mx=21 THEN mx=1
1067 IF mv=bv THEN bx=bx+1:IF bx=21 THEN bx=1
1068 ft=ft+1
1069 RETURN
1070 IF INKEY(1)=-1 AND j<>4 THEN 1080
1071 IF MID$(b$(mv),mx-1-20*(mx=1),1)=" " THEN RETURN
1072 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,"  ":LOCATE#1,2*mx
-1,2*mv:PRINT#1,"  ";
1073 b$(mv)=LEFT$(b$(mv),mx-1)+" "+RIGHT$(b$(mv),20-mx
)
1074 mx=mx-1:IF mx=0 THEN mx=20
1075 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,CHR$(200);CHR$(201
);:LOCATE#1,2*mx-1,2*mv:PRINT#1,CHR$(202);CHR$(203);
1076 sc=sc+10:LOCATE 11,24:PRINT USING"######";sc
1077 ft=ft+3
1078 GOTO 1200
1080 IF INKEY(63)=-1 AND j<>8 THEN 1090
1081 IF MID$(b$(mv),mx+1+20*(mx=20),1)=" " THEN RETURN
1082 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,"  ":LOCATE#1,2*mx
-1,2*mv:PRINT#1,"  ";
1083 b$(mv)=LEFT$(b$(mv),mx-1)+" "+RIGHT$(b$(mv),20-mx
)
1084 mx=mx+1:IF mx=21 THEN mx=1
1085 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,CHR$(200);CHR$(201
);:LOCATE#1,2*mx-1,2*mv:PRINT#1,CHR$(202);CHR$(203);
1086 sc=sc+10:LOCATE 11,24:PRINT USING"######";sc
1087 ft=ft+3
1088 GOTO 1200
1090 IF INKEY(0)=-1 AND j<>1 THEN 1100
1091 IF MID$(b$(mv-1-10*(mv=1)),mx,1)=" " THEN RETURN
1092 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,"  ":LOCATE#1,2*mx
-1,2*mv:PRINT#1,"  ";
1093 b$(mv)=LEFT$(b$(mv),mx-1)+" "+RIGHT$(b$(mv),20-mx
)
1094 mv=mv-1:IF mv=0 THEN mv=10
1095 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,CHR$(200);CHR$(201
);:LOCATE#1,2*mx-1,2*mv:PRINT#1,CHR$(202);CHR$(203);
1096 sc=sc+10:LOCATE 11,24:PRINT USING"######";sc
1097 ft=ft+3
1098 GOTO 1200
1100 IF INKEY(2)=-1 AND j<>2 THEN 1110
1101 IF MID$(b$(mv+1-10*(mv=10)),mx,1)=" " THEN RETURN
1102 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,"  ":LOCATE#1,2*mx
-1,2*mv:PRINT#1,"  ";
1103 b$(mv)=LEFT$(b$(mv),mx-1)+" "+RIGHT$(b$(mv),20-mx
)
1104 mv=mv+1:IF mv=11 THEN mv=1
1105 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,CHR$(200);CHR$(201
);:LOCATE#1,2*mx-1,2*mv:PRINT#1,CHR$(202);CHR$(203);
1106 sc=sc+10:LOCATE 11,24:PRINT USING"######";sc
1107 ft=ft+3
1108 GOTO 1200
1110 REM
1200 REM *move checks*
1210 a$=MID$(b$(mv),mx,1)
1220 IF a$="*" THEN GOTO 2000
1225 IF a$="*" THEN GOTO 2500
1230 RETURN
2000 REM *dead*
2005 SOUND 2,800,2,15,1,1
2010 li=li-1
2020 IF li=-1 THEN d=1:RETURN
2030 LOCATE 1,25:PRINT STRING$(li,216);" "
2032 WHILE SQ(2)<>4:WEND
2035 PEN#1,1
2040 LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(208);CHR$(209
);:LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(210);CHR$(211);
2045 PEN#1,2
2050 mx=20:mv=6
2055 LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(200);CHR$(201
);:LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(202);CHR$(203);
2060 RETURN
2500 REM *defused*
2505 SOUND 2,400,0,15,1,2
2512 b$(mv)=LEFT$(b$(mv),mx-1)+"#"+RIGHT$(b$(mv),20-mx
)
2520 bn=bn+1
2530 sc=sc+100+10*bn
2535 LOCATE 11,24:PRINT USING"######";sc
2540 IF bn/5=bn THEN GOSUB 8200:RETURN
2550 bn=0
2560 GOSUB 6000
2570 sh=sh+1
2575 mx=20:mv=6
2580 GOSUB 8000
2590 LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(200);CHR$(201
);:LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(202);CHR$(203);
2600 RETURN
3000 REM *burn fuse*
3005 ft=ft+1:IF ft<4 THEN RETURN ELSE ft=0
3010 fu=fu-1
3020 LOCATE fu+1,22:PRINT CHR$(219);" "
3030 IF fu>2 THEN RETURN
3035 SPEED INK 2,2
3040 FOR i=1 TO 15
3045 SOUND 7,0,20,(15-i)/2,0,0,i
3046 FOR j=0 TO 3:INK j,INT(RND*27),INT(RND*27):NEXT
3050 NEXT
3055 INK 0,0:INK 1,24:INK 2,6:INK 3,11
3060 LOCATE#1,bx*2-1,bv*2-1:PRINT#1,"  ":LOCATE#1,bx*2
-1,bv*2:PRINT#1,"  ";
3070 b$(bv)=LEFT$(b$(bv),bx-1)+" "+RIGHT$(b$(bv),20-bx
)
3075 li=li-1
3080 IF li=-1 THEN d=1:RETURN
3085 LOCATE 1,25:PRINT STRING$(li,216);" "
3090 PEN#1,3:LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(212);
CHR$(213);:LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(214);CHR$
(215);:PEN#1,2
3095 mx=20:mv=6
3100 LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(200);CHR$(20
1);:LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(202);CHR$(203);
3110 GOSUB 8200
3120 RETURN
4000 REM *game over*
4005 WHILE SQ(2)<>4:WEND
```

OMB








```
4010 CLS#2
4020 LOCATE#2,2,2:PRINT#2,"GAME OVER"
4030 RESTORE 4035:FOR k=1 TO 4:READ N:FOR F=0 TO 2:SOU
ND 2,F,N*(2^F),105,5,2,0:NEXT:NEXT
4035 DATA 380,379,426,478
4040 IF SQ(4)<>4 THEN 4040 ELSE RETURN
5000 REM *instructions*
5010 CLS#1
5020 WINDOW SWAP 0,1
5030 PRINT:PRINT TAB(15);CHR$(164);" CT '85"
5035 PRINT:PRINT
5040 PRINT"   Help Arnold the Anarchist find his
 Lost Bomb before it blows him up"
5050 PRINT:PRINT:PRINT"Keys:":PRINT
5055 RESTORE 5070
5060 FOR k=1 TO 6:READ a$:PRINT TAB(4);a$:NEXT
5070 DATA":  Up","\  Down & Bonus","[  Left","]  Right
","A  Slide Left","S  Slide Right"
5080 PRINT:PRINT:PRINT TAB(12);"Space Bar To Start"
5085 WINDOW SWAP 0,1
5090 WHILE INKEY(47)=-1:WEND
5100 RETURN
6000 REM *bonus points*
6010 FOR k=1 TO 20:LOCATE#1,1,1:PRINT#1,CHR$(11):NEXT
6015 PEN#1,1
6020 FOR k=1 TO 39 STEP 2:LOCATE#1,k,19:PRINT#1,CHR$(2
08);CHR$(209);:LOCATE#1,k,20:PRINT#1,CHR$(210);CHR$(21
1);:NEXT
6025 PEN#1,0
6030 b=(1-INT(RND*20))*2-1
6035 LOCATE#1,b,19:PRINT#1,CHR$(204);CHR$(205);:LOCATE
#1,b,20:PRINT#1,CHR$(206);CHR$(207);
6040 x=1:y=1
6050 LOCATE #1,x,y:PRINT#1,CHR$(200);CHR$(201);:LOCATE#
1,x,y+1:PRINT#1,CHR$(202);CHR$(203);
6060 IF INKEY(22)<>-1 THEN 6100
6065 xx=x:yy=y
6070 x=x+2:IF x=41 THEN x=1:y=y+2:IF y=19 THEN LOCATE
#1,15,10:PRINT#1,"TOO LATE!!":SOUND 2,400,0,15,1,1,40:W
HILE SQ(2)<>4:WEND:RETURN
6080 LOCATE #1,xx,yy:PRINT#1,"  ":LOCATE#1,xx,yy+1:PRI
NT#1,"  ";
6090 GOTO 6050
6100 k=y
6105 LOCATE #1,x,k:PRINT#1,CHR$(200);CHR$(201);:LOCATE#
1,x,k+1:PRINT#1,CHR$(202);CHR$(203);
6110 CALL &B0:9
6115 k=k+1:IF k<20 THEN LOCATE #1,x,k-1:PRINT#1,"  ":G
OTO 6105
6120 IF x=b THEN LOCATE #1,15,10:PRINT#1,"BONUS POINTS
":sc=sc+400+25*sh+25*(17-y):LOCATE 11,24:PRINT USING"
######";sc:SOUND 2,402,0,15,1,2:WHILE SQ(2)<>4:WEND:RE
TURN
6140 LOCATE #1,15,10:PRINT#1,"MISSED IT!":SOUND 2,800,
0,15,1,1:WHILE SQ(2)<>4:WEND:RETURN
7000 REM *start game*
7012 sc=0:l=3:sh=1:p=0
7013 x=20:y=6
7015 GOSUB 8000
7016 LOCATE 11,24:PRINT USING"######";0
7020 LOCATE#1,39,11:PRINT#1,CHR$(200);CHR$(201):LOCATE
#1,39,12:PRINT#1,CHR$(202);CHR$(203)
7030 LOCATE 1,25:PRINT STRING$(3,216)
7040 RETURN
8000 REM *set up board*
8010 PEN#1,2:FOR k=1 TO 10:b$(k)="********************
":LOCATE #1,1,20:PRINT #1:PRINT#1,b$;:NEXT:PEN#1,0
8015 PEN#1,1
8020 FOR k=1 TO 15-3*sh
8025 x=1+INT(RND*20):y=1+INT(RND*10):IF MID$(b$(y),x,1
)<>"*" OR (x=ax AND y=ay) THEN 8025
8030 b$(y)=LEFT$(b$(y),x-1)+"@"+RIGHT$(b$(y),20-x)
8032 LOCATE#1,x*2-1,y*2-1:PRINT#1,CHR$(208);CHR$(209);
:LOCATE#1,x*2-1,y*2:PRINT#1,CHR$(210);CHR$(211);
8035 NEXT
8040 GOSUB 8200
8050 LOCATE 39,25:PRINT USING"##";sh
8099 RETURN
8200 REM *place bomb*
8205 PEN#1,0
8210 bx=1+INT(RND*20):by=1+INT(RND*10):IF MID$(b$(by),
bx,1)<>"*" OR (bx=ax AND by=ay) THEN 8210
8215 b$(by)=LEFT$(b$(by),bx-1)+"#"+RIGHT$(b$(by),20-bx
)
8220 LOCATE#1,bx*2-1,by*2-1:PRINT#1,CHR$(204);CHR$(205
);:LOCATE#1,bx*2-1,by*2:PRINT#1,CHR$(206);CHR$(207);
8225 LOCATE 1,22:FOR k=1 TO 22-3*sh:PRINT CHR$(217);CH
R$(218);:NEXT:PRINT"  "
8227 fu=2*(22-3*sh):ft=0
8230 RETURN
9000 REM *once only*
9010 SYMBOL AFTER 256:MEMORY &8999:SYMBOL AFTER 200
9020 SYMBOL 200,7,7,31,37,7,15,31,63
9030 SYMBOL 201,224,224,248,164,224,240,248,252
9040 SYMBOL 202,63,63,63,63,4,4,52,124
9050 SYMBOL 203,252,252,252,252,32,32,44,62
9060 SYMBOL 204,0,0,1,0,0,3,15,1
9070 SYMBOL 205,141,0,36,64,136,192,240,240
9080 SYMBOL 206,19,31,31,31,15,15,3,0
9090 SYMBOL 207,240,240,248,240,240,240,192,2
9100 SYMBOL 208,0,3,15,31,28,28,31,5
9110 SYMBOL 209,0,192,240,240,132,152,240,240
9120 SYMBOL 210,3,3,192,252,3,3,252,192
9130 SYMBOL 211,192,192,3,63,192,192,63,3
9140 SYMBOL 212,0,15,24,48,112,112,116,116
9150 SYMBOL 213,0,252,6,2,2,2,2,2
9160 SYMBOL 214,116,116,115,120,127,127,63,0
9170 SYMBOL 215,2,2,130,6,252,248,240,0
9180 SYMBOL 216,56,124,56,124,254,254,40,108
9190 SYMBOL 217,0,0,0,48,201,10,4,0
9200 SYMBOL 218,0,0,0,96,153,6,0,0
9210 SYMBOL 219,0,16,60,0,124,0,40,0
9300 RESTORE 9320:FOR k=0 TO 160:READ n:POKE &9000+k,n
:NEXT
9310 DATA 221,126,2,50,161,144,221,126,3,50
9320 DATA 162,144,221,126,0,254,1,202,26,144
9330 DATA 254,3,202,87,144,201,6,0,197,17
9340 DATA 163,144,42,161,144,1,2,0,237,176
9350 DATA 237,91,161,144,42,161,144,1,2,0
9360 DATA 9,1,78,0,237,176,237,91,161,144
9370 DATA 33,78,0,25,235,33,163,144,1,2
9380 DATA 0,237,176,42,161,144,1,80,0,9
9390 DATA 34,161,144,193,16,190,201,6,0,197
9400 DATA 17,163,144,42,161,144,1,78,0,9
9410 DATA 1,2,0,237,176,42,161,144,1,178
9420 DATA 0,9,1,2,0,237,176,42,161,144
9430 DATA 17,77,0,25,235,42,161,144,1,77
9440 DATA 0,9,1,237,181,237,91,161,144,35
9450 DATA 163,144,1,2,0,237,176,42,161,144
9460 DATA 1,0,0,9,34,161,144,193,16,185
9470 DATA 201
9480 MODE 1
9490 hi=0
9500 WINDOW #1,1,40,2,21
9505 WINDOW#2,15,26,12,14
9510 INK 0,0:INK 1,24:INK 2,6:INK 3,11
9520 BORDER 0
9530 PAPER 0:PEN 1
9535 PAPER #1,3:PEN #1,0
9537 PAPER#2,0:PEN#2,1
9540 CLS:CLS#1
9545 LOCATE 12,1:PRINT"T I M E  B O M B"
9550 LOCATE 5,24:PRINT"SCORE: ";USING"######";0;:PRINT"
   HIGH SCORE: ";USING"######";hi:LOCATE 33,25:PRINT"SH
EET: 0";
9600 DIM b$(10)
9610 FOR k=1 TO 20:b1$=b1$+CHR$(212)+CHR$(213):NEXT
9620 FOR k=1 TO 20:b2$=b2$+CHR$(214)+CHR$(215):NEXT
9700 ENT -1,10,4,,1,-20,1
9710 ENV 1,15,-1,0
9720 ENT -2,10,-5,1,1,20,1
9725 ENV 2,15,-1,2
9730 RETURN
```

■

COMMODORE 64, BBC AND SPECTRUM

THE PROGRAMS given here will enable Spectrum, BBC, and CBM-64 owners to download via *Your Computer's* Telsoft service. Each month for each machine we transmit at least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program, Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with

```
5 REM   HEX LOADER FOR CBM 64   FIG.1
6 REM
10 FOR I=680 TO 727:READA:POKEI,A:T=T+A
20 NEXT:IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA ";T-6716:END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,200
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 68,79,87,78,76,79,65,68
100 SA=51000:LA=52855
110 INPUT"START ADDRESS";A
120 IF (A<SA) OR (A>LA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT:PRINT"ADDRESS ERROR":GOTO 110
150 T=(A-32768)AND255:PRINTA;:INPUTD$
160 IF D$="END" THEN GOTO 900
170 IF LEN(D$)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B$=MID$(D$,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
210 POKE A+B,D:T=T+D:NEXT
220 B$=MID$(D$,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A = A+8:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B+E)C$"??"
290 B=8:NEXT:GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B$)
310 C$=MID$(B$,N,1):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT:RETURN
330 D=D*16+X:NEXT:RETURN
400 X=ASC(C$)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H$="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;"? ";:T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT"=";
560 Y=INT(T/256):PRINT MID$(H$,Y+1,1);
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT:GOTO 900
600 PRINT MID$(H$,INT(X/16)+1,1);
610 PRINT MID$(H$,1+(XAND15),1);:RETURN
800 SYS 680:C$=CHR$(34)
810 PRINT:PRINT"TO RELOAD CODE :"
815 PRINT:PRINT"LOAD"C$"DOWNLOAD";
820 PRINTC$",1,1  (RETURN)"
825 PRINT:PRINT"THEN TYPE  NEW";
830 PRINT"  (RETURN)"
835 PRINT:PRINT"TO RUN THE PROGRAM"
840 PRINT"  SYS 51000  (RETURN)"
900 PRINT:PRINT:PRINT"1  ENTER DATA"
910 PRINT:PRINT"2  PRINT DATA"
920 PRINT:PRINT"3  SAVE DATA"
930 INPUT Z:ON Z GOTO 100,500,600
```

```
51000 ? A9068D21D08D20DC=3E2
51008 ? A90F8D8602A90E20=2E4
51016 ? D2FFA9008D15D0A9=4D3
51024 ? FF8D0A02BA8E92CE=510
51032 ? 20CAC920C7CB20F8=4D5
51040 ? CAAD80CEC931FE23=532
51048 ? C935F014C936D006=43F
51056 ? 208EC74C5BC7A914=410
51064 ? 2002FF202FC3D0DB=52E
51072 ? 203FC8A92020D2FF=461
51080 ? 4C93C94C4AC82063=411
51088 ? CC2022CDA95685FD=4E1
51096 ? A9CE85FE2028CDA0=547
51104 ? 002095CC202FCBC9=404
51112 ? 44F00BC954D0ED20=4E1
51120 ? D2FFA901D007A944=4EF
51128 ? 20D2FFA90085BA20=4B9
51136 ? 25CDA903204BC2A9=4A3
51144 ? BD85FDA9CD85FEA0=A60
51152 ? 002095CC2025CD20=383
51160 ? 95CC9846A0048C83=4CC
51168 ? CE2018C968A02025=404
51176 ? CD2095CC9843A926=4C5
51184 ? 8DA3CE20D8C9ADA7=5E3
51192 ? CE85FBADA8CE85FC=6EA
51200 ? 68A82060CBA501E5=38A
51208 ? B8E5B598A293A0CE=539
51216 ? 20BUFFAEA3CEACAA=567
51224 ? CEE8D001C82025CD=479
51232 ? A9FB20D8FF20F1CB=597
51240 ? 6020D9CCC50D100E=3FE
51248 ? A90085C7A92020D2=3E3
51256 ? FFA90D20D2FF60A9=4E7
51264 ? 0D2029C8A90D20D2=3A6
51272 ? FF602063CCA000A9=43F
51280 ? FF9993CEC8I0FA20=5FB
51288 ? D2CB9AFE20D2CBB0=5ED
51296 ? FB8D72CE90A08C7C=400
51304 ? CE8C70CE202ECCAD=4D4
51312 ? 72CE29F0C980D0E4=5C6
51320 ? 20D2CEB01A9973CE=599
51328 ? C8207ECCC0090UF0=45B
51336 ? A000AD76CE2980D0=492
51344 ? 3FA52B85F318A52C=308
51352 ? 6D75CE85FC4CAAC0=5E7
51360 ? AD79CE25FEAD79CE=607
51368 ? 85FC20D2CBB0A920=55E
51376 ? D9CC20D2FF3820D9=607
51384 ? CC202ECCC010DAEA=528
51392 ? A9202UD2FFAD75CE=56A
51400 ? 202ECD20D2CBB087=4D7
51408 ? CI7CCEF00BA05820=503
51416 ? D2FF2030C84C57C8=52C
51424 ? 20D2C9B0F8CJ7DCE=65D
51432 ? D0EBAD75CEA8B993=687
51440 ? CED00E2030C8A991=4EE
51448 ? 20I2FF4C7EC94C57=51F

51456 ? C8A000CC7CLE8C7D=447
51464 ? CE20D2CBB0F091FB=5BF
51472 ? 202ECCC8CC77CED0=4D3
51480 ? F020D2CBBAE0C87C=59E
51488 ? CEF008A95820D2FF=4D8
51496 ? 4C57C820D2CBB0CE=4CE
51504 ? CD7DCF00034C23C9=473
51512 ? 20ACC92030C8AD75=409
51520 ? CEA8A9009993CEAD=506
51528 ? 84CEC902D02520EC=436
51536 ? CBA9C820FC3CB955=598
51544 ? 2016CDA95320F3C3=432
51552 ? 20C7CBAC73CEC888=54F
51560 ? 8993CED02398D0F7=5D4
51568 ? 4C5EC7F95E2016CD=3DF
51576 ? 20F1CB4C63C9A277=4E7
51584 ? CE2002C5B8D0FA20=57D
51592 ? D2CB20D2CB4C47C9=53C
51600 ? 4C5CC9A02B85FBA5=4F5
51608 ? 2C85FCA2001FB899=52A
51616 ? 2200C8B1FB8523F0=4CE
51624 ? 0BA522A5FB032385=447
51632 ? FC4C9DC9:8A5FB69=57D
51640 ? 02852D852F8531F5=37B
51648 ? FC6900852E853085=412
51656 ? 32602053C3A9028D=3E1
51664 ? 34CEA90B8D025E60=4A3
51672 ? 8E81CE8C82CEA200=533
51680 ? A9098DCDCE202FCE=414
51688 ? C914F016C90DF051=4E2
51696 ? C924D01920D2FF8D=544
51704 ? C3CEE84CE5C9E000=64B
51712 ? D0E3E00AF0DF20D2=554
51720 ? FFCA4CE5C9C93090=554
51728 ? D4C93A901548ADC3=444
51736 ? CEC924F004634CE5=460
51744 ? C95AC24190BFC947=4BA
51752 ? B03B20D2FF38E930=4D5
51760 ? C90A9002E907E005=56A
51768 ? F0PB91C3CEE84CE5=61A
51776 ? C9E000FWA0E091D0=52A
51784 ? 07ADC3CEC924F095=4FF
51792 ? A92020D2FFA9FF9D=54F
51800 ? C3CEA200AECFCE0E=544
51808 ? D0CE8EI1CE8ED2CE=699
51816 ? FDC3CEC924D005A9=512
51824 ? 0F8DCDCEE83DC3CE=5DD
51832 ? C9FFF01D20CBC4B0=5B2
51840 ? 3418BDC3CEEDCFCE=524
51848 ? 8DCFCEA5006DD0CE=566
51856 ? 8ID0CEB020E34C75=534
51864 ? CAADCFCEAC83CE99=642
51872 ? A3CEC8ADD0CE99A3=660
51880 ? CEC8188C83CEAC82=561
51888 ? CEAE81CE6A2025CD=4ED
51896 ? A2008D41CEC921F3=530
51904 ? 0720D2FFE84C8ACA=570
51912 ? 4CDEC9ADCDCE8DCE=65F

51920 ? CEADCFCE8DD1CEAD=6C1
51928 ? D0CE8ND2CC18ALD1=635
51936 ? CE6DCFCE8DCFCE9D=58F
51944 ? D2CE6DD0CE8DD0CE=6BE
51952 ? B035CECECEDAE6A0=625
51960 ? 2063CCA90F8D8602=414
51968 ? A95185FDF9CI85FE=575
51976 ? A0802C9DCC2025CD=343
51984 ? 209DCC209DCC209D=30F
51992 ? CC2022CD20A9CC20=3A6
52000 ? 95CC2022CD2095CC=411
52008 ? 202FCB20D2FF008E=421
52016 ? 81CF8C82CE2069CC=4B3
52024 ? 20ECCC20CACCC300=48F
52032 ? D00D20FDCCC93!F0=4F0
52040 ? 062001CC4C35C9AD=314
52048 ? 00CEAE81CEAC82CE=597
52056 ? 60AE52CE9A4C5BC7=4CE
52064 ? 2022CDA92285FDA9=465
52072 ? CE85FEA00A2095CC=4DA
52080 ? 2025CDA00FA92099=393
52088 ? 93CE08D0FA8I93CE=619
52096 ? 202FCBC914D010C0=417
52104 ? 00F0F520D2FF80A9=58F
52112 ? 209993CE4C80CBC9=50A
52120 ? 0DF00B20D2FF9993=4ED
52128 ? CEC8C010D0DAF920=579
52136 ? 20D2FF60A92020D2=4B4
52144 ? FFA94F20D2FFA34B=58C
52152 ? 20D2FF60A9138D00=452
52160 ? DEA9:28D00DE60A9=4CD
52168 ? 538D00DEA9528100=40E
52176 ? DE60A99618ED87CE=547
52184 ? 0C82CEAC92CE2004=4D4
52192 ? CC20ECCCCE07CE00=677
52200 ? 02386020FDCCB0EE=509
52208 ? 60A9FA8C82CEA820=597
52216 ? 04CC86D0FAAC82CF=616
52224 ? 60200400C84H290CA=3EE
52232 ? D0FDAA2069CC6020=454
52240 ? 25CDA90220ABCC20=364
52248 ? 95CCAD0FCE20I2FF=573
52256 ? FE2020I2FFA90320=3A5
52264 ? ABCC20D3C9504D7D=48A
52272 ? CE8D7DCEA208AD7D=4AA
52280 ? CE2A0010HD7DCE49=411
52288 ? 088D7DCEAD7CCE49=460
52296 ? 108D7CCE2E7CCE2E=3D5
52304 ? 7DCEC9D0E169A000=516
52312 ? A9009900D4C8C018=40E
52320 ? D0F660A99320D2FF=5B3
52328 ? 6048A5A2290FD01F=37E
52336 ? A5I44A05A2291UF0=441
52344 ? 05A9A44C80CCA920=42B
52352 ? 20D2FFA90085D4A9=51C
52360 ? 9D20D2FF6885D469=53F
52368 ? 6020D2FFC5B1FDC5=620
52376 ? 21D0F6C8602025CD=4B3

52384 ? A50C20ABCC2095CC=46D
52392 ? 60A9058E31CEAAA9=4E6
52400 ? 2020D2FFCADAFAAE=403
52408 ? 91CE60C914F008C9=505
52416 ? 7FF00160F91460A9=456
52424 ? 7FE020E4FFC9C190=5C4
52432 ? 07C9DBBA03?0E96U=4AF
52440 ? 90C941900EC95B90=494
52448 ? 08C9619006C97BB0=49C
52456 ? 02492060488A480F=215
52464 ? 20F1FFI0034C59CB=533
52472 ? 2868AA6B60AD03DE=485
52480 ? 49015A9003A90060=250
52488 ? A3011E6048AD00DE=3C7
52496 ? 49026A6A6860200C=223
52504 ? CDB0FB8I01IE20EC=508
52512 ? CC602025CD2028CD=373
52520 ? A90D20D2FF604829=3A0
52528 ? F06A6A5A6A0930C9=3CA
52536 ? 3A300318690720I2=21F
52544 ? FF6820F0930C93A=31B
52552 ? 30031869072002FF=2F4
52560 ? 50444F574E4C4F41=204
52568 ? 44204D454E55213.=243
52576 ? 2020205245434549=228
52584 ? 5645213520202045=1FE
52592 ? 5845542054F2042=289
52600 ? 4153494321362020=22F
52608 ? 2053415645204259=28A
52616 ? 5445532.28205553=285
52624 ? 452012205354F50=26D
52632 ? 209220544F205245=2C4
52640 ? 545552454E20544F20=2CC
52648 ? 4D454E5520292145=28C
52656 ? 4E544552204E554D=2F9
52664 ? 4245522021454620=281
52672 ? 4144445245535320=256
52680 ? 4953204 94E204845=208
52688 ? 582C119D9D9D9D9D=476
52696 ? 9D9D9D9D9D9D9D9D=5C0
52704 ? 2D9D9D9D50524546=481
52712 ? 4958205749544920=305
52720 ? 2421535441525420=2E3
52728 ? 4144445245535320=31E
52736 ? 464F522041524541=228
52744 ? 202146494E414C20=1D3
52752 ? 4144445245535320=206
52760 ? 464F522041524541=238
52768 ? 2021505 24F475241=22C
52776 ? 4D20544954 4C4520=237
52784 ? 204D415820313620=1E5
52792 ? 4048415227532920=219
52800 ? 21124E4F54205641=21B
52808 ? 4C4944492C205452=2A5
52816 ? 5920414741494E20=249
52824 ? 3A20214449534320=216
52832 ? 4F5220544150452D=26B
52840 ? 2020442-54202920=1E0
52848 ? 3F21000000000000=0DA
```

TELSOFT



A reminder of how to use the Telsoft service.

a number of other makes. For the CBM-64 it will initially only be available with the CEL Comms pack together with the Telemod 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR 60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&69FF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A>&6F87 THEN 280
60 IF A<&6A00 OR A>&6F87 THEN 20
70 PRINT ~A" ";
80 INPUT ":" B$,C$
90 IF LEN(B$) <>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X$= MID$(B$,2*N+1,1): GOSUB 300
130 IF E=1 THEN 260
140 X$= MID$(B$,2*N+2,1): GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+MID$(B$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT
190 FOR M = 1 TO LEN (C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E =1 THEN A=A-1: GOTO 260
220 NEXT
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-8:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=8*(A DIV 8):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6F87
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2 BBC.

```
6A00 :A9CBA0FEA20120F4,4C6
6A08 :FF2066C20486DC9,3BA
6A10 :31F003C934F0E9C9,4CE
6A18 :35F0054C0C6A4C47,290
6A20 :6AA90C20E3FFA9E0,482
6A28 :A000A2FF20F4FFA5,4FB
6A30 :03A20020F4FFA902,363
6A38 :A20220F4FFA9C0A0,4C8
6A40 :FEA20020F4FF60A9,48C
6A48 :0C20E3FF20F76BA9,439
6A50 :15A20120F4FFA00A,3EB
6A58 :A9FF8099056FD0FA,5E7
6A60 :A915A20120F4FF20,354
6A68 :0C6C90F6200C6CE0,340
6A70 :FBA0008477B47BE4,416
6A78 :79847AB47B857020,3BB
6A80 :3561A057829F0C90,499
6A88 :D0E2200C6CE0D099,45B
6A90 :7100C028D56DC009,364
6A98 :D0F0A000A5742930,422
6AA0 :D009A51CA5761BA5,354
6AA8 :1065736577200C6C,289
6AB0 :B00520E3FFC020D5,324
6AB8 :6DC010D0F0A57320,435
6AC0 :B26D200C6C90A0C5,3CC
6AC8 :7AF000A95020E3FF,178
6AD0 :20E7FF4C676A200C,34F
6AD8 :6C900CC570F000A9,4BC
6AE0 :5820E3FF20E7FF4C,4AC
6AE8 :676AAC73A009A56F,43E
6AF0 :D00E20E7FFA90020,3B0
6AF8 :E3FF4C03684C676A,469
6B00 :A000847AB47B200C,2C9

6B00 :5C80F2917620D54D,477
6B08 :CBC475D0F1200C6C,45A
6B10 :80F1C574F00BA950,4CE
6B20 :20E3FF20E7FF4C67,4DD
6B28 :6A200C6CB0CFC57B,3C1
6B30 :F000A95B20E3FF4C,447
6B38 :676A20E76B20E7FF,429
6B40 :A573A0A9D0F7D56F,3FA
6B48 :A5EAC9020D5B2DD7,419
6B50 :6BA9C020556CA955,3BB
6B58 :20306EA95E20556C,29B
6B60 :A915A70120F4FF20,394
6B68 :F76BA471C0B0B905,505
6B70 :6F0D519BD0F7A90C,4A4
6B78 :20E3FF20A56DA95A,437
6B80 :B532A96F0503A907,3D7
6B88 :20006E20F96D2048,2D8
6B90 :6DA90520006E9900,2DA
6B98 :20E3FF20FB6DA9D2,502
6BA0 :20E0FF4C0C6AA955,3BF
6BA8 :20306EA9562055AC,2DE
6BB0 :4C6A6BA475200C6C,2D2
6BBE :B8D0FA200C6C200C,31E
6BC0 :6C4C4B6B4C6C6AA9,336
6BC8 :2020E3FFA96F70E3,430
6BD0 :FFA96B20E3FF60A9,51E
6BD8 :9CA000A60AE002D0,41E
6BE0 :0BA21320F4FFA212,3B7
6BE8 :20F4FF60A29220F4,4C0
6BF0 :FFA29620F4FF60A9,555
6BF8 :9CA000A60AE00200,41E
6C00 :EBA25320F4FFA252,4E7
6C08 :20F4FF6010A99605,4AF
6C10 :3F047EA971A00020,33D
6C18 :F4FFB009C007D005,448
6C20 :6B684C0C6AA47E20,2D4

6C28 :496CC63FD0023B60,374
6C30 :A58AC98200062879,369
6C38 :6E80EC60A991A201,447
6C40 :20F4FF9BA47EB0DF,55C
6C48 :6B0AA2D2CAEB0AD0,5AA
6C50 :FB3A60A90B047EA8,450
6C58 :20496C0BD0FA247E,449
6C60 :60A9E8A000A2FF20,452
6C68 :F4FFA90005AA490C,460
6C70 :20E3FF20CB6DA904,3E4
6C78 :20006EA9090502A9,2F0
6C80 :6F8503A00020FB6E,39C
6C88 :78156DC941F00BC9,370
6C90 :42F011C943F0174C,3A7
6C98 :616C6900A20120F4,335
6CA0 :FF4C876C9900A203,3C4
6CA8 :20F4FF4C876CA900,433
6CB0 :A20420F4FFC6A0A5,4CE
6CB8 :7C20E3FFA47E20A0,46B
6CC0 :6DA98820006E20FB,2C4
6CC8 :6DA017201563C941,290
6CD0 :F000C947F011C943,413
6CD8 :F0174C616CA90742,372
6CE0 :0120F4FF4C096DA9,37F
6CE8 :07A20320F4FF4C09,314
6CF0 :6DA907020420F4FF,3D6
6CF8 :E6B4A5EAC7070009,443
6D00 :A9E3A000A20120F4,3EB
6D08 :FFA57C20E3FF2053,495
6D10 :6C20536C6020A16D,2E3
6D18 :A9E520006E20F96D,2C1
6D20 :20486D490520006E,274
6D28 :20FB6D20AB6DA905,36B
6D30 :20006E20FE6D20AB,2DE
6D38 :6D0176A90120006E,2A9
6D40 :A93220E0FF057C60,4DB

6D48 :A90C20E3FF20AB6D,30F
6D50 :A90720006EA99AB0,306
6D58 :02A95E8503A00020,361
6D60 :FB6D20A66D20996D,3C0
6D68 :20996D20996D20A0,357
6D70 :6DA90A20006E20F8,2C6
6D78 :5D20AB6DA9022000,270
6D80 :6E20FB6D20FB6D20,34B
6D88 :E7FFA90220E0FF4B,5AB
6D90 :A90FA90020F4FF58,3D5
6D98 :60A90020006E20F8,2B7
6DA0 :6D20AB6D6020A66D,33A
6DA8 :20486D20E7FF20E7,445
6DB0 :FF604B29F06A6A6A,3FE
6DB8 :6A0930C93A300310,1F1
6DC0 :690720E3FF60290F,312
6DC8 :0930C93A30031869,1F0
6DD0 :0720E3FF60457B05,3AE
6DD8 :7B4200A5793A990C,3B8
6DE0 :A57B49000578A57A,390
6DE8 :4910057A267A2678,299
6DF0 :CA00E86020E3FFCB,5AC
6DF8 :0102C900D0F6C060,4F7
6E00 :B670AAA92020E3FF,478
6E08 :CAD0FAA67D60C97F,55F
6E10 :D00BA9B620F4FFEB,4F3
6E18 :00F012A97FC92000,3C3
6E20 :0EC9EAF00AC90DF0,3A1
6E28 :06C907F002A90060,2D1
6E30 :B57C867D347EA999,440
6E38 :F20120F4FFA903A2,404
6E40 :0720F4FFA996A203,403
6E48 :20F4FF9E2902F0F4,4BA
6E50 :A47CA997A20720F4,41F
6E58 :FA903A20420F4FF,464
6E60 :A991A20020F4FF80,49F

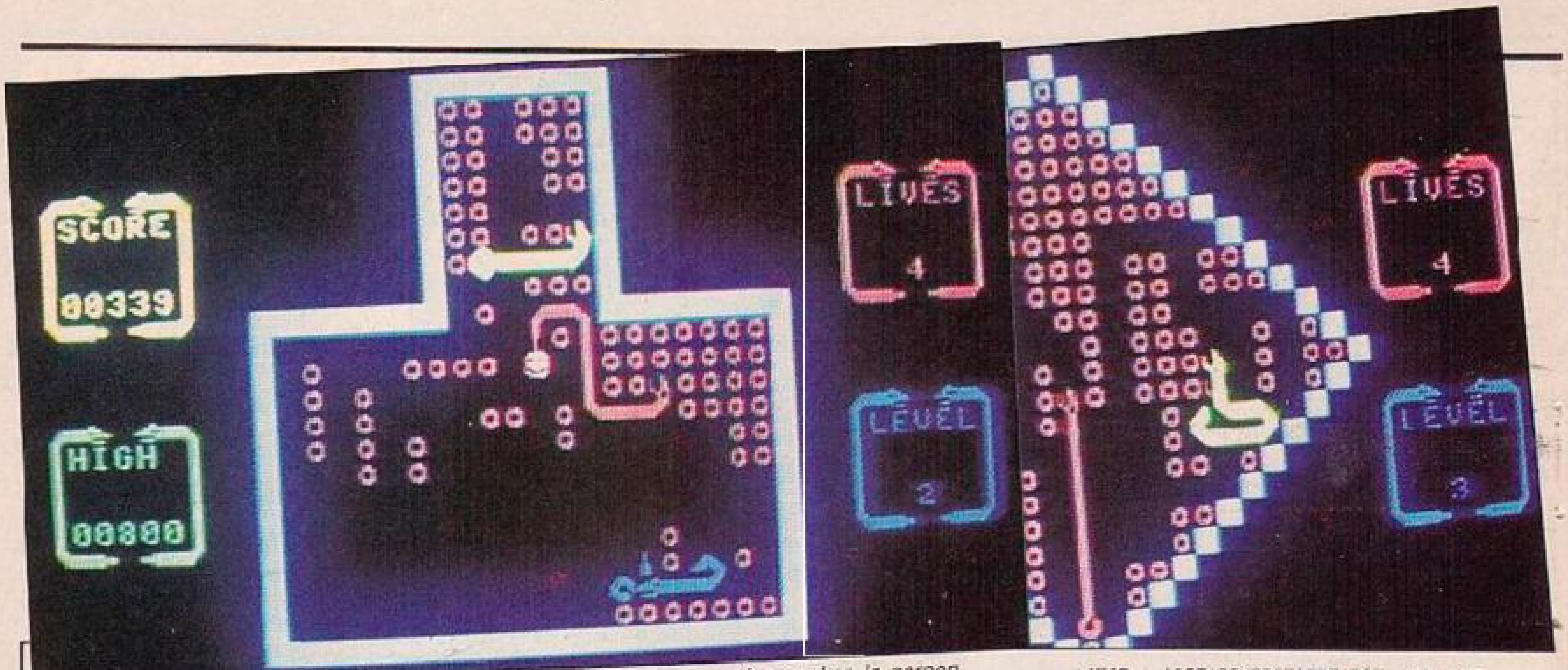
6E68 :09C00D00056B6B4C,2C1
6E70 :0C6AA57CA67D647E,3DC
6E78 :6B847C867D495A47,446
6E80 :0820F4FF902901F0,3C8
6E88 :08A995A20920F4FF,408
6E90 :981B90013BA67DA4,348
6E98 :7C60444F574E4C4F,281
6EA0 :4144494E47204D45,215
6EA8 :4E550D3120202052,193
6EB0 :4543454956450D34,1F2
6EB8 :2020205345542042,1AE
6EC0 :6175642052617465,2C6
6EC8 :0D35202020455849,1B8
6ED0 :5420544F20424153,20D
6ED8 :49430D454E544552,217
6EE0 :20484F4C44455200,1F6
6EE8 :2020555345204354,1EC
6EF0 :524C204720544F20,1F5
6EF8 :52455455524E2054,254
6F00 :4F2040454E552029,1ED
6F08 :0D53455420545241,200
6F10 :4E534D4954204261,24E
6F18 :756420526174650D,292
6F20 :4120202037352042,16F
6F28 :6175640D42202033,1FC
6F30 :303020426175640D,209
6F38 :4320313230302042,188
6F40 :6175640D53455420,253
6F48 :5245434549564520,223
6F50 :4261756420526174,2C3
6F58 :650D50524F475241,230
6F60 :4D20204C4F414445,1F2
6F68 :4420206F6E0D5052,20D
6F70 :45535320414E5920,213
6F78 :4E455920464F5220,210
6F80 :4D454E550D202020,1A2
```

Figure 1. Spectrum.

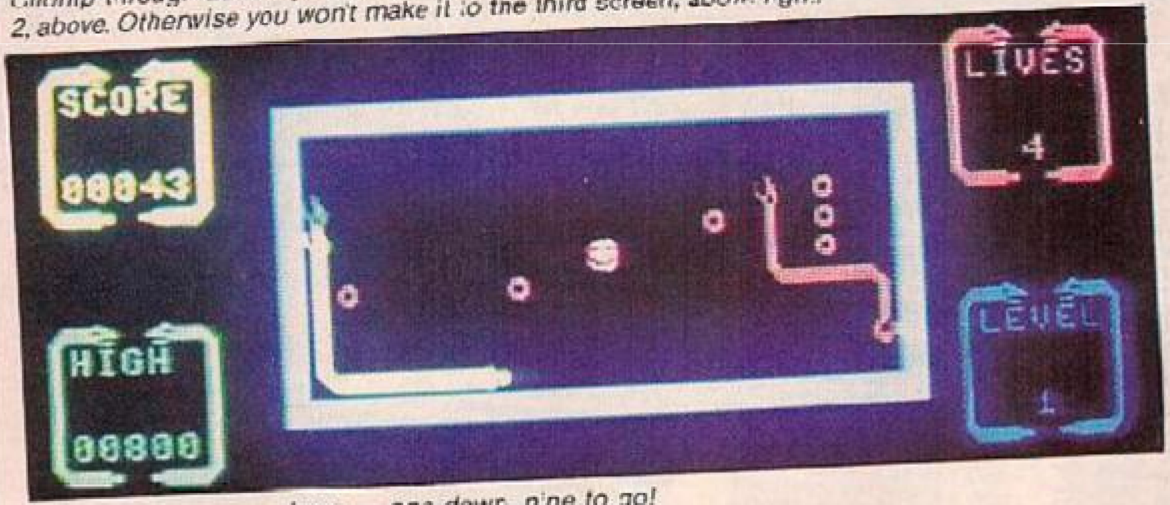
```
5 REM SPECTRUM 48k         fig 1
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23658,8: CLS : PRINT
30 INPUT "Start Address ";a
50 IF a>61135 THEN GO TO 280
60 IF a<60000 THEN GO TO 20
70 PRINT a;
80 INPUT " : ";b$
85 IF b$="END" THEN GO TO 280
90 IF LEN b$<>20 THEN GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y: NEXT n: LET y=0
190 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN PRINT ":";b$: GO TO 50
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 SAVE "download"CODE 60000,1136
290 POKE 23658,0: STOP
300 LET e=0: LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD15EDC307EECD15,4C7
60008 :FDCD36ECCD66EDCD,631
60016 :30EDCD47EE38FBCD,5AF
60024 :B8ECFE31CA99EAFE,69A
60032 :35CA07EAC366EACD,5D8
60040 :15E03EFACD04EDCD,5FD
60048 :15EDC9CD15EDC366,553
60056 :EACD66ED11E5E806,58C
60064 :B03EFF121310FCCD,45B
60072 :15EE11CDEE86173E,3D2
60080 :20121310FCCD1FFD,3DA
60088 :30F0CD50EDCD1FED,5BB
60096 :30FB32A5EF3E0032,3E9
60104 :6CEF325FEF3270EF,544
60112 :3A4BEF2DEFFC3465,5A1
60120 :EFE6F0FE0020DC0E,627
60128 :091165EFCD1FEDDA,5B1
60136 :AAEA1312CDEBEC0D,552
60144 :20F23A69EFE66020,51F
60152 :0021405C3A6BEF0E,36C
60160 :004709224BEF0E00,1DA
60168 :11CDEECD1FED3B99,47F
60176 :12130CCDEBEC79FE,45C
60184 :1820FB3A6BEFCDDB,447
60192 :ECCD1FEDDAAAEA21,574
60200 :6FEFEE2B133E5011,326
60208 :E8EE12133E0012CD,340
60216 :D7ECCD4AFCC3AAEA,6B1
60224 :CD1FEDDAAAEA2170,518
60232 :EFBE20E121E5EE3A,524
60240 :60EF056F3E000C67,3CC
60248 :5FA0BE2008CDE7EC,40F
60256 :3E2132005CC3FFEB,4B6
60264 :3E00326FEF3270EF,3C7
60272 :ED5869EF0E00CD1F,40C
60280 :EDDAAAEA3273EFCD,634
60288 :EBEC3A6BEFFC0020,5BA
60296 :053A69EFE6003A73,432
60304 :EF12130C3A6AEF09,3FC
60312 :20DCCD1FEDDAAAEA,5D8
60320 :216FEFDECD22EBCD,5E4
60328 :1FEDDAAAEA2170EF,5A2
60336 :0EC22DEB3E6F3202,5B9
60344 :EE3E6B32E3EE3E00,498
60352 :32E4EE3A005CFE21,5B1
60360 :2003CD15EECD07EC,553
60368 :CDA6EC21E5EE3A6B,5C5
60376 :EF056F3E000C6736,422
60384 :0021E5EEED4B66EF,561
60392 :0C7EFE00C2B0EA23,4FC
60400 :0D20F63EFACD04ED,589
60408 :3E01D3FEC366EACD,5E8
60416 :1FED30FBC30DEAF3,594
60424 :0603AFC3FF10FE3E,3D8
60432 :4003FF3EFF03FF3E,56F
60440 :31D3FF3E0F320F5C,385
60448 :32005C32485C3E01,250
60456 :03FF21915CC09EFB,560
60464 :CD50EDC366EACD15,52F
60472 :EEC066ED3E01D3FE,556
60480 :2165EE3E08CD0FEC,442
60488 :CD04ECCDA3ECCDA6,654
60496 :EC23CD77ECCD77EC,50F
60504 :CDA0ECCD04ECCDA6,661
60512 :EC233E0DCD0FECCD,4CF
60520 :04EC23CDA3EC3E03,498
60528 :CD0FECCD04ECC9CD,A08
60536 :A3EC3E07CD0FECCD,561
60544 :04EC23C97EFE00CB,520
60552 :CD3BED23C304ECFE,651
60560 :00D0FE3E20C0BBED,528
60568 :F13DC30FECCD0BEC,65D
60576 :CDA3ECCDA6EC3E00,5A6
60584 :CEB0ED3EFF320C5C,574
60592 :C9F513E6F0CB1FCB,60C
60600 :1FCB1FCB1FF630FE,4CF
60608 :3AFAC5ECC6071213,493
60616 :F1E60FF630FE3AFA,686
60624 :D4ECC6071213C921,46C
60632 :C3EEE5CD04ECE10D,69C
60640 :173E20772310FC3E,339
60648 :0077C9E52170EFAE,538
60656 :77C50E0E7EA7CB17,449
60664 :30007ECC00773AAF,329
60672 :EFEE10326FEF3721,3D5
60680 :6FEFCB1623CB1600,350
60688 :20E2C1E1C9110501,394
60696 :216A00CD9503C93E,32F
60704 :963277EFCD47EDDA,639
60712 :2EEDF1C366EACDAC,5C8
60720 :ED7BE601F602D3FE,540
60728 :AF2177EF35200237,2FC
60736 :C9CD77EB30ECC9CD,4F0
60744 :47EED0FECBC837C9,5E6
60752 :F5D0FF3A01EFFE00,5C7
60760 :20043E3610023E37,187
60768 :D3FFD07FF1C9F53A,675
60776 :01EFFE0020043E36,376
60784 :D3FFCD50EDF1C93E,644
60792 :00D0FFE60037C8D0,59[illegible]
60800 :FFC40237C8E0FFE6,626
60808 :302004D07F47C93A,3E0
60816 :01EFFE0020043E37,397
60824 :10073E36D3FFD07F,452
60832 :F9CD47ED3A73EFD0,5DE
60840 :F1C366EAF53ED230,3EE
60848 :20FDF1C9CDACED3D,62A
60856 :20FAC9C5D5E5F5FE,70D
60864 :7F2013CDF9EDFE0C,537
60872 :200CFE0D2E053E20,29A
60880 :D73E0D0718103E20,34F
60888 :D73E00D73A005CFE,4E0
60896 :2120033E00D73E5F,2E6
60904 :073E00D7F1E1D1C1,640
60912 :C9FE07201CFEC820,4F3
60920 :19FE0C2014FE0E20,308
60928 :10FE0D200CFE20FA,367
60936 :0FEEFE00FA11EE3E,4BA
60944 :00C93E07C9CD60ED,32C
60952 :3E02CD01163E1832,1C4
60960 :095CC93E121601CD,302
60968 :1122C93E121600CD,257
60976 :1122C9[illegible]
60984 :CD0116CD47EE38FB,451
60992 :CD5CEEE1D1C1C93A,5CD
61000 :385CCE6F290C3A00,20F
61008 :5C7E21385CCB6EF1,4C3
61016 :A7C937C9F5110000,3DE
61024 :CE10EBF1C9444F57,4D6
61032 :4E4C4F4144494E47,284
61040 :204D454E550D3120,216
61048 :2020524543454956,275
61056 :450D322020204578,217
61064 :697420746F204261,328
61072 :7369630D20205573,20F
61080 :652053796D626F6C,393
61088 :2053686966742020,30B
61096 :204720746F205265,2C9
61104 :7475726E20746F20,39C
61112 :4D454E550D0D0045,27B
61120 :4E544552204E5540,389
61128 :4245532200000000,1C1
```



Chomp through as many eggs as you can before releasing the captive snakes in screen 2, above. Otherwise you won't make it to the third screen, above right.



The opening screen above — one dowr, nine to go!

Listing 1. The hex loader.

```
10 PRINT"         SNAKES 64 H
EX LOADER"
20 INPUT" START ADDRESS";SA
25 PRINT
30 FORAD=SATO20992STEP10
40 CH=0:PRINTAD;:INPUT"]":H$
43 IFH$="S"THEN170
45 IFLEN(H$)<>20THEN40
50 FORI=0TO9
60 X=ASC(MID$(H$,I*2+1,1))
70 Y=ASC(MID$(H$,I*2+2,1))
80 X=X-48:IFX>9THENX=X-7
90 Y=Y-48:IFY>9THENY=Y-7
100 POKEAD+I,X*16+Y:CH=CH-X*16+Y
110 NEXTI
120 PRINTTAB(23)"CH";:INPUTC
130 IFCH=CTHEN160
140 PRINT" CHECKSUM ERROR! TRY A
GAIN."
150 GOTO40
160 NEXTAD
170 INPUT" FILE NAME";F$
180 FORI=1TOLEN(F$):POKE39999+I,
ASC(MID$(F$,I,1)):NEXT
190 POKE780,1:POKE781,1:POKE782,
1
200 SYS65466
210 POKE780,LEN(F$):POKE781,64
220 POKE782,156:SYS65469
230 POKE252,136:POKE251,54:POKE7
80,252
240 POKE781,0:POKE782,82:SYS6549
6
```

Listing 2. The code.

```
13960 : EDED0200209BA5000000 CH: 828
13970 : 08429BA5008100008100 CH: 652
13980 : 00000000F00300003300 CH: 117
13990 : 33003300330033000000 CH: 204
14000 : 0000FFFFFFFF3FFF001D CH: 1367
14010 : FFFFFF3F00FFFF000000 CH: 1333
14020 : 00000100020304050607 CH: 28
14030 : 1A0B1B0E1BEC1B0D1A0D CH: 193
14040 : 1A0C1A0B1B0B1B0C1B0D CH: 192
14050 : 1A0D1A0C00FFA0A0A0A0 CH: 381
14060 : 0E0C0E0D0D0D0D0C0D0B CH: 128
14070 : 0E0B0E0C0E0D0D0D0D0C CH: 129
14080 : 00FF0C120D120D130D14 CH: 381
14090 : 0C140C130C120D120D13 CH: 156
14100 : 0D140C140C1300FF1304 CH: 374
14110 : 14041405140613061305 CH: 124
14120 : 13041404140514061306 CH: 123
14130 : 130500FF1A121B121B13 CH: 414
14140 : 1B141A141A131A121B12 CH: 227
14150 : 1B131B141A141A1300FF CH: 439
14160 : 0B0B0C0B0C0C0C0D0B0D CH: 118
14170 : 0B0C0B0B0C0B0C0C0C0D CH: 117
14180 : 0B0D0B0C00FF13041404 CH: 349
14190 : 14051406130613051304 CH: 123
14200 : 14041405140613061305 CH: 124
14210 : 00FF1B0B1C0B1C0C1C0D CH: 413
14220 : 1B0D1B0C1B0B1C0B1C0C CH: 196
14230 : 1C0D1B0D1B0C00FF1312 CH: 412
14240 : 14121413141413141313 CH: 194
14250 : 13121412141314141314 CH: 193
14260 : 131300FF0E050F050F06 CH: 353
14270 : 0F070E070E060E050F05 CH: 102
14280 : 0F060F070E070E0600FF CH: 339
14290 : 19051A051A061A071907 CH: 158
14300 : 19061905 1A051A061907 CH: 157
14310 : 1907190600FF0E110F11 CH: 381
14320 : 0F120F130E130E120E11 CH: 163
14330 : 0F110F120F130E130E12 CH: 164
14340 : 00FF19111A111A121913 CH: 429
14350 : 19131912191119111912 CH: 216
14360 : 1A13191319120 0FF0B05 CH: 403
14370 : 0C050C060C070B070B06 CH: 89
14380 : 0B050C050C060C070B07 CH: 88
14390 : 0B0600FF100B110B110C CH: 356
14400 : 110D100D100C100B110B CH: 142
14410 : 110C110D100D100C00FF CH: 371
14420 : 170B180B180C180D170D CH: 178
14430 : 170C170B180B180C180D CH: 177
14440 : 170D170C00FF0B110C11 CH: 383
14450 : 0C120C130B130B120B11 CH: 148
14460 : 0C110C120C130B130B12 CH: 149
14470 : 00FF0D0C0C0E0B100A12 CH: 361
14480 : 0A12091409140914 0916 CH: 145
14490 : 08160816081608160914 CH: 149
14500 : 0D140D140D120D120D10 CH: 141
14510 : 0C0E0D0C0D070E070E08 CH: 114
14520 : 0E090D090D080D070E07 CH: 107
14530 : 0E080E090D090D0800FF CH: 343
14540 : 13031403140414051305 CH: 118
14550 : 13041303140314041405 CH: 117
14560 : 1305130400FF19071A07 CH: 267
14570 : 1A081A0519091908 1907 CH: 168
14580 : 1A071A081A0919091908 CH: 169
14590 : 00FF190F1A0F1A101A11 CH: 421
14600 : 1511191019 0F1A0F1910 CH: 206
14610 : 1F111911191000FF1313 CH: 419
14620 : 14131414141513151314 CH: 199
14630 : 13131413141414151315 CH: 198
14640 : 131400FF0D0F0E0F0E10 CH: 381
14650 : 0E110D110D100D0F0E0F CH: 147
14660 : 0E100E110D110D1000FF CH: 375
14670 : 0B030C030C040C050305 CH: 78
14680 : 0B040B030C030C040C05 CH: 77
14690 : 0B050B0400FF13031403 CH: 331
14700 : 14041405130513041303 CH: 118
14710 : 14031404140513051304 CH: 119
14720 : 00FF1B031C031C041C05 CH: 381
14730 : 1B051B041B031C031C04 CH: 156
14740 : 1C051B051B0400FF030B CH: 373
14750 : 0C0B0C0C0C0C0D0B0D030C CH: 119
14760 : 0B0B0C0B0C0C0C0D030D CH: 118
14770 : 0B0C00FF1B0B1C0B1C0C CH: 395
14780 : 1C0D1B0D1B0C1B0B1C0B CH: 197
14790 : 1C0C1C0D1B0D1B0C00FF CH: 415
14800 : 0B130C130C140C150D15 CH: 159
14810 : 0B140B130C130C140C15 CH: 157
14820 : 0B150B1400FF13131413 CH: 395
14830 : 14141415131513141313 CH: 198
14840 : 14131414141513151314 CH: 199
14850 : 00FF1B131C131C141C15 CH: 445
14860 : 1B151B141B131C131C14 CH: 236
14870 : 1C151B151B1400FF8142 CH: 594
14880 : 5911119D9D9D9D9D9D9D CH: 1222
14890 : 9D9D909A414E44455253 CH: 1076
14900 : 20204755535441465353 CH: 688
14910 : 4F4E0011111D1D1D1C45 CH: 388
14920 : 41542354484520454747 CH: 649
14930 : 53204259205341535349 CH: 686
14940 : 4E47234F564552205448 CH: 685
14950 : 454D220D1D1D1D425554 CH: 525
14960 : 2041554F494420544845 CH: 660
14970 : 20444541444C5920534E CH: 660
14980 : 414B45532E205748454E CH: 676
14990 : 0D1D1D1D544845524520 CH: 508
15000 : 415245204E4F20454747 CH: 648
15010 : 53204C4546542C20594F CH: 659
15020 : 552043414E0D1D1D1D45 CH: 496
15030 : 4154205448452053 4E41 CH: 664
15040 : 4B45532E20424F4E5553 CH: 696
15050 : 204C4946452045564552 CH: 658
15060 : 590D1D1D1D3130303020 CH: 414
15070 : 504F494E54532E111111 CH: 574
15080 : 9D9D9D9D9D9E46312020 CH: 1120
15090 : 53544152542047414D45 CH: 712
15100 : 0D111D1D1D1D1D1D1D1D CH: 262
15110 : 1D1D4633202047414D45 CH: 525
15120 : 2053504545443A0D111D CH: 518
15130 : 1D1D1D1D1D1D1D1D1D46 CH: 331
15140 : 3520204D5553494320 4F CH: 613
15150 : 4E2F4F46460D11111D1D CH: 549
15160 : 1D1D1D1D1D1D1D1D5055 CH: 397
15170 : 5420414F59535449434B CH: 740
15180 : 20494E20504F52542032 CH: 622
15190 : 9E534C4F5720209E4D45 CH: 851
15200 : 4449554D9E4641535420 CH: 795
15210 : 204C4729D9D1151459D9D CH: 963
15220 : 1149485454545459D9D9D CH: 969
15230 : 9D115420205 49D9D919D CH: 1034
15240 : 115420205 49D9D9D9111 CH: 894
15250 : 5454545446444E1D5644 CH: 729
15260 : 47119D45119D45119D45 CH: 900
15270 : 119D45119D9D9D9D9D9D CH: 1202
15280 : 9D4944421D4044489F9D CH: 911
15290 : 9D9D9D9D9D9145919D45 CH: 1370
15300 : 919D45919D459E53434F CH: 1129
15310 : 52459D9D9D9D9D111111 CH: 987
15320 : 1E4849474809D9D9D9D11 CH: 990
15330 : 11111C4C4956455339D9D CH: 753
15340 : 9D9D9D111111F4C4556 CH: 794
```

SNAKES

Nine screens of snakes coiled up inside your CBM-64. Serpents and eggs are on this unusual menu from Anders Gustafsson — eat them before they lunch you.

SNAKES IS a machine-code program for the CBM-64 and joystick. When you run it, you'll first be shown the title page and hear some music. After you have chosen your game speed, the game starts. On each screen there will be an area filled with eggs, and also a varying number of snakes. Only one of these, the red one, can eat eggs. This means that the other snakes are trapped until you or the red one let them out.

The object of the game is to eat all the eggs without being killed. When there are no eggs left, you can eat the snakes by crossing their tails, but you must still avoid their heads. And when the snakes are gone, the next screen is waiting for you. There are nine different screens available.

If you want to play the game, first type in the hex loader in listing 1. Run it, and input the start address. You can now enter the code, 10 bytes — no spaces — and a checksum each time. If there are any checksum errors, the program will tell you. You can save the code to tape at any time by typing S. When you have entered the code and saved it, you can hopefully run the program with

SYS 16384

If you think it's too much work to type the code in, I can supply you with a copy of the program on a cassette. Please send £3, name and address to: Anders Gustafsson, Krokelyckan 52, 421 70 V Frolunda, Sweden.

```
15350 : 454C9D9D9D1111119D00 CH 824
15360 : 43414A00000000004341 CH 346
15370 : 4A000008000043414A00 CH 288
15380 : 0006000043414A030008 CH 222
15390 : 000043414A0002003000 CH 214
15400 : 43414A00000000034341 CH 346
15410 : 4A000008000043414A00 CH 288
15420 : 0006000043414A030008 CH 222
15430 : 000043414A0003003000 CH 214
15440 : 00000FFFFF0F20031813 CH 588
15450 : 18183C3C3C3C3000F0FF CH 787
15460 : FFF000003C3C3C3C1818 CH 783
15470 : 18180000FFFFFFFF0000 CH 1069
15480 : 3C3C3C3C3C3C3C3C0000 CH 480
15490 : 03070F1F3E3C3000C0E0 CH 594
15500 : F0F87C3C3C7CF8F0E0C0 CH 1760
15510 : 00003C3E1F0F07030000 CH 176
15520 : 3C7EBFC7E7FF7E3C3C7A CH 1430
15530 : F7E7E7FF7E3C3C7EFFE7 CH 1822
15540 : E3FD7E3C3C7EFE7E7EFF CH 1808
15550 : 5E3C00E0F83EFFC07C00 CH 1259
15560 : 6C6E7B39391918300007 CH 519
15570 : 1F7CFF033E001013989C CH 823
15580 : 9C1E76367FFF99FFFF3D CH 1783
15590 : C37E7EFF99FF3C81C37E CH 1755
15600 : FFFFFFFFFFFFFFFF003C CH 2100
15610 : 7E66667E3C00038D1210 CH 767
15620 : 000000EF13001F151000 CH 390
15630 : 04108721104706031F15 CH 341
15640 : 108721104706081F1510 CH 353
15650 : 7707308721109805100C CH 543
15660 : 0710470508872108A225 CH 482
15670 : 10470600DF27003C2A10 CH 491
15680 : 470608872108A2251061 CH 573
15690 : 08103E2A10470603A51F CH 425
15700 : 10A22510E90730872110 CH 703
15710 : 61081047061047050831 CH 508
15720 : 1210000008EF13031F15 CH 360
15730 : 103004100872110470609 CH 353
15740 : 1F15108721104706081F CH 368
15750 : 15107707388721109805 CH 560
15760 : 100C0710470538311C10 CH 228
15770 : FB04081E1908831710B4 CH 726
15780 : 0408311C00872110ED05 CH 523
15790 : 103E2A10B40408A22508 CH 535
15800 : 872110080508311C10A5 CH 607
15810 : 1F102303108721108603 CH 422
15820 : 10A22510F40308D11210 CH 729
15830 : 000008EF13081F151030 CH 390
15840 : 04108721104706081F15 CH 341
15850 : 108721104706081F1510 CH 353
15860 : 7707308721109805100C CH 543
15870 : 0710470508872108A225 CH 482
15880 : 10470600DF27003C2A10 CH 421
15890 : 470608872108A2251061 CH 573
15900 : 08103E2A10470608A51F CH 425
15910 : 10A22510E90730872110 CH 703
15920 : 61081047051047060887 CH 434
15930 : 2110000008A225083E2A CH 368
15940 : 10610808872108A22510 CH 520
15950 : 8F08103E2A1077070887 CH 558
15960 : 2108A225106108088721 CH 537
15970 : 083E2A10007008872108 CH 331
15980 : A225105108103E2A10A7 CH 623
15990 : A6A8872108A225106108 CH 510
16000 : 088721083E2A10470608 CH 389
16010 : 872108A225106108103E CH 574
16020 : 2A10470603A51F10A225 CH 554
16030 : 10E07072087211061081 CH 533
16040 : 47051000031030049205 CH 312
16050 : 48414C4C234F46204641 CH 637
16060 : 4D451C3000355001AA50 CH 510
16070 : 05A9A41AA9A41A95901A CH 1045
16080 : 40401A10001A90000694 CH 558
16090 : 0005A93001AA4000EA90 CH 660
16100 : 0017903005A40001A401 CH 506
16110 : 01A40656A41AAAA41AAA CH 977
16120 : 9005AA10035500001501 CH 430
16130 : 541A41A41A41A41A91A4 CH 929
16140 : 1A91A41A91A41AA5A41A CH 1051

16150 : A5A41AA9A41AA9A41A69 CH: 1178
16160 : A41A6AA41A6AA41F5AA4 CH: 1036
16170 : 1A5AA41A46A41A46A41A CH: 826
16180 : 46A41A41A41A41A41540 CH: 829
16190 : 540000550001FA4E06AA CH: 580
16200 : 9006AA901A96F41F96A4 CH: 1144
16210 : 1A41A41A41A41A41A41A CH: 791
16220 : 41A41A41A41A55A41AAA CH: 955
16230 : A41AAAA41AAAF41F55A4 CH: 1159
16240 : 1A41A41A41A41A41A41A CH: 791
16250 : 41A4154154001541541A CH: 595
16260 : 41A41A46A41A46901A5A CH: 845
16270 : 901A5A401A5A401F6A40 CH: 709
16280 : 1AA9001AA9001AA4001A CH: 605
16290 : A4001AA9001AA9001A6A CH: 686
16300 : 401A6A401A5A901A5A90 CH: 780
16310 : 1A46A41A46A415415400 CH: 690
16320 : 1555541AAAA41AAAA41A CH: 936
16330 : FAA41A55541A43001A40 CH: 709
16340 : 001A55001AA9001AA900 CH: 30.
16350 : 1A55001A40001A40301A CH: 317
16360 : 40001A40001A43001A55 CH: 355
16370 : 541AAAA41AAAA41A9AA4 CH: 1164
16380 : 155554[illegible]FC4936 CH: 1103
16390 : E5FDA9D485FFA00034FE CH: 1701
16400 : E1FC91FEC8C019D0F7A9 CH: 1869
16410 : E18502858DA903853CA9 CH: 1079
16420 : 3D858D78A9678D1403A9 CH: 1060
16430 : E18D1503A50129FB3501 CH: 838
16440 : F00084FCA93085FD19D0 CH: 1524
16450 : E5FFA20CE1FE91FC08D0 CH: 1700
16460 : F9E6FD66FFCAD0F2A501 CH: 2035
16470 : E904850159A00084FCA9 CH: 948
16480 : 3485FDA95085FEA93C85 CH: 1436
16490 : FFE1FE91FCC8D0[illegible] CH: 2106
16500 : F9A185FCA93685FDA000 CH: 1484
16510 : 84FEA9D085FFB1FCC9FF CH: 2036
16520 : F00291FEC8C020D0F3A0 CH: 1689
16530 : FE8CF8078CFD07C88CF9 CH: 1635
16540 : 07C88CFA07C88CFB07C8 CH: 1402
16550 : 8CFC07A9418D2F42A993 CH: 1203
16560 : 20D2FFA205A0101020F0 CH: 1139
16570 : FFA200A01EA93A203748 CH: 1121
16580 : A238A01EA93B20B74820 CH: 955
16590 : EB41A210A00A20FD40A2 CH: 1031
16600 : E8A00820FD40A2C8A006 CH: 1269
16610 : 20FD40A298A00420FD40 CH: 1176
16620 : A270A00220FD40A248A0 CH: 1179
16630 : 0020FD404C2C4186FD84 CH: 1053
16640 : FEA9D085FFA000B1FEAA CH: 1780
16650 : E88A01FEC900D005A220 CH: 1377
16660 : 8E10D0C5FDD003AE10D0 CH: 1430
16670 : ED00F001C9A200C0D0FD CH: 1416
16680 : 4C0741EAA9008DFE7F20 CH: 1105
16690 : A043AD00DCC96FF055A5 CH: 1427
16700 : C5C904F04FC905F0064C CH: 1249
16710 : 2C41EAEAEAADFE7FC900 CH: 1566
16720 : D0DFEAA9FF8DFE7FAD2F CH: 1831
16730 : 4238E9201002A9418D2F CH: 827
16740 : 42206B414C3141A213A0 CH: 801
16750 : 1A1820F0FFAD2F42C941 CH: 1129
16760 : 1002A056C921D302A05D CH: 1153
16770 : C901D0CCA064A2079933 CH: 1069
16780 : 20B74900A2008E15008E CH: 1050
16790 : 10808ED1808ED2808ED3 CH: 1648
16800 : 808ED480E88ED5808EDE CH: 1689
16810 : 80A2048ED680A99320D2 CH: 1336
16820 : FFA91220D2FFA99A20D2 CH: 1584
16830 : FFA00084FEA99285FFD1 CH: 1631
16840 : FFC8C0D0D0F9AEDE30CA CH: 2037
16850 : 10062065494C1C42CAD0 CH: 1001
16860 : 062099494C1C42CAD006 CH: 850
16870 : 20514A4C1C42CAD00620 CH: 805
16880 : FA4A4C1C42CAD00620D0 CH: 1163
16890 : 4A4C1C42CAD00620A441 CH: 774
16900 : 4C1C42CAD00620A44D4C CH: 935
16910 : 1C42CAD00620094E4C1C CH: 733
16920 : 4220074F200A53EA2062 CH: 670
16930 : 42EAEAEA20004590934C CH: 1092

16940 : E245A20188D0FDCAD0FA CH: 1715
16950 : AED980C900D0E320ED48 CH: 1495
16960 : EED580EEDE80ADDE83C9 CH: 1891
16970 : 0FD012A9018DDE80AD2F CH: 1117
16980 : 4229E920100CA9018D2F CH: 763
16990 : 424CB041A9122002FFA9 CH: 1236
17000 : 0E8D1A81AC1A81208942 CH: 858
17010 : AE1A8118691A8D1A81C9 CH: 980
17020 : DED0ED60A004CAD0F088 CH: 1712
17030 : D0FA6084F7A90085FEA0 CH: 1649
17040 : 8C84F8C884FFA000B1F7 CH: 1679
17050 : 91FEC8C01AD0F7358FAD CH: 1721
17060 : 1881858EC980D0034280 CH: 1129
17070 : 4260AE1781AC16813320 CH: 899
17080 : CF48B1FE290F8D9602AD CH: 1211
17090 : 1FD4C9FAA00BC90AB322 CH: 1506
17100 : C58AB02B4C08439D1881 CH: 1083
17110 : 858EAD1981858F390338 CH: 1103
17120 : E58E858EA90038E58F85 CH: 1376
17130 : 0F4C0043DD1881858FAD CH: 1063
17140 : 1981858E4C0843AD1881 CH: 906
17150 : 858FAD1981858E4CD042 CH: 1241
17160 : AD178118558FAAAD1681 CH: 1087
17170 : 18658EA83820CA48B1FE CH: 1228
17180 : 290F85FECD8502F003C9 CH: 1233
17190 : 00F023C90AF02A4CC142 CH: 1114
17200 : AD178118558FAAAD1681 CH: 1087
17210 : 18658EA81820CA48B1FE CH: 1196
17220 : C995D00F204E434C5743 CH: 980
17230 : CEDA80D003CEDB8060A9 CH: 1581
17240 : FE85FEA90085FFA002B1 CH: 1665
17250 : FE388891FEC8C8C8C01A CH: 1743
17260 : D0F3A58E8D1881186D14 CH: 1205
17270 : 813D1681A8A58F8D1981 CH: 1192
17280 : 185D15818D1781AA1820 CH: 802
17290 : F0FFAD1981C900F00EC9 CH: 1477
17300 : 01F005A9504CAF43A94E CH: 1066
17310 : 4CAF43AD1981C901F005 CH: 1092
17320 : A9514CAF43A94F20D2FF CH: 1313
17330 : AC1481AE15811820F0FF CH: 1196
17340 : AD1281CD1681D0034C24 CH: 999
17350 : 449D1381CD1781D0034C CH: 1033
17360 : 3144AE1481AC1581EC12 CH: 1016
17370 : 81F022B010CC1781B005 CH: 1132
17380 : A9464C6344A9494C6344 CH: 967
17390 : EACC17813005A9474C63 CH: 1186
17400 : 44A9484C6344EACC1381 CH: 1139
17410 : B010EC1681B006A9464C CH: 1076
17420 : 6344EAA9474C6344EC16 CH: 1142
17430 : 81B006A9494C6344EAA9 CH: 1195
17440 : 484C6344AD1381CD1781 CH: 993
17450 : F012A9454C6344AD1281 CH: 1059
17460 : CD1681F005A9444C6344 CH: 1081
17470 : AE1481AC1581EC1681F0 CH: 1272
17480 : 0DB006A94C4C6344EAA9 CH: 1086
17490 : 4A4C6344CC1781B006A9 CH: 1024
17500 : 4D4C6344EAA94D20D2FF CH: 1295
17510 : A90285FEA98185FFA000 CH: 1404
17520 : B1FEC90081D009C8B1FE CH: 1613
17530 : 88CD0181F039C8C8C018 CH: 1383
17540 : [illegible]C0081AE01811820 CH: 1103
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17560 : 81F00CB005A9404CB544 CH: 1120
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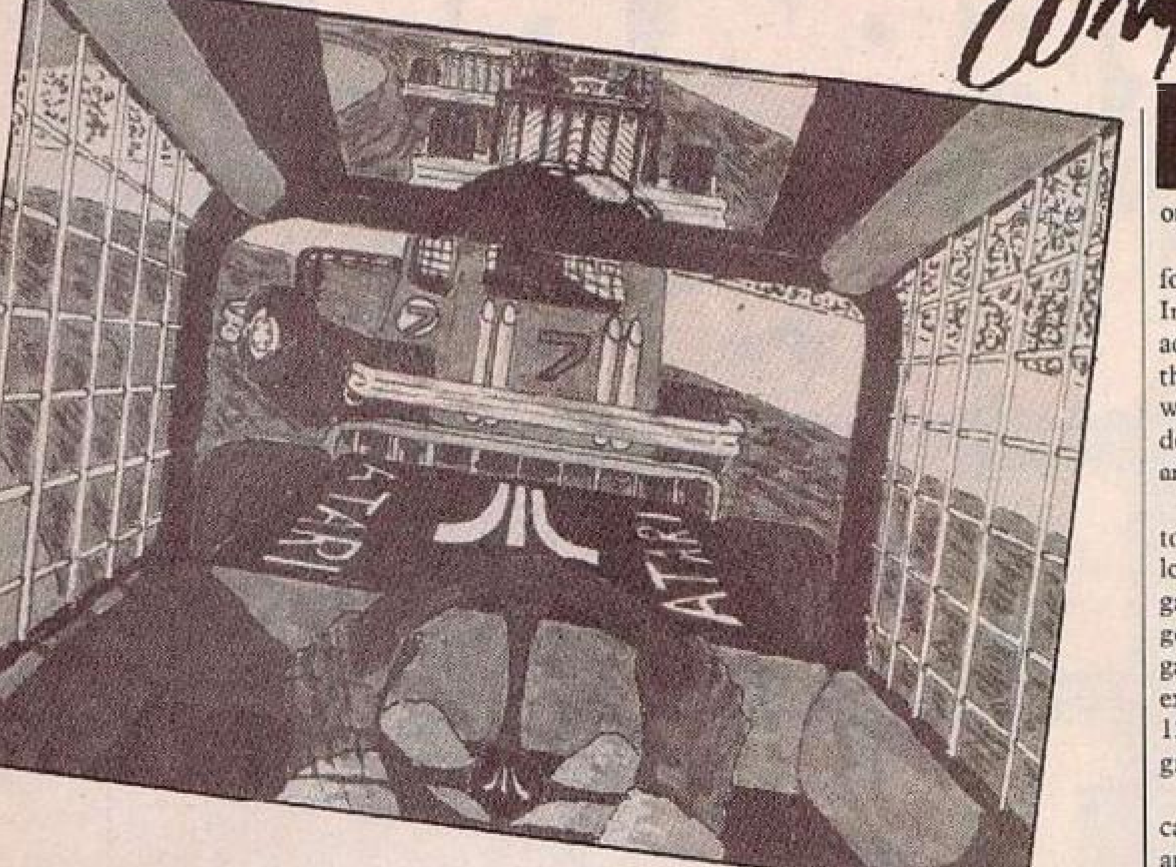
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■

WIN AN ATARI 130XE *competition* RESULTS



J Stone's Battle of the Chevrolets.

IN JUNE'S competition to win Atari's 128K computer, the 130XE, you were asked first to write a plot for a game which could take advantage of the Atari's extra memory, then to name the five worst programs you ever paid money for. As a prize for the runners-up we offered copies of Firebird's Don't Buy This tape, a compilation of the five worst programs ever sent in for evaluation.

When we set the competition we thought we would be able to draw up a definitive list of the great software disasters of our time. As it turned out, there was almost no consensus on what is good and what is bad. No two entries agreed on more than one title. Some people even nominated such chart-toppers as Ghostbusters, Harrier Attack, and Jeff Minter's Gridrunner — in our book, one of the all-time greats. The moral seems to be that, as far as games are concerned, one man's meat is another man's poison, or as the Romans put it: De gustibus non disputandum est.

If there was one game that qualified for the title of worst-ever it was Legend's The Great Space Race — probably because it was so over-hyped and, at £14, over-priced. Among the other games that received at least three nominations apiece were: Alcatraz Harry, Blue Thunder, Flight Path 737, Mad Martha, Airwolf, Micro Olympics, Johnny Reb, Gulpman, Winged Avengers, Pedro, Zip Zap, JCB Digger, Schizoids, Ah Diddums.

You may be surprised to learn that the last three came from Imagine, a company responsible for some of the best games of 1983/84. But they date from the time when Imagine's production line was churning out programs at a rate of almost one a week.

No doubt some of these titles do not deserve their place on the list. People are often unduly severe on a game if it has been hyped up and then falls short of expectations. It is probably also unfair to compare games written in 1982 with today's software. Winged Avengers and Gulpman, for example, were produced when the Spectrum was in its infancy.

Admittedly, Winged Avengers — a monochrome shoot-em-up from a long-forgotten company called Workforce — was truly bad; but, for its time, Gulpman was one of the best Pacman games around. It is surprising nobody nominated Specman, Jega's version of Pacman on the Spectrum.

There were also scores of games that received only one nomination. Most of them have long since passed out of circulation. Who remembers Kosmic Piracy, Fred's Fan Factory, Astro Blast, or Carnival Massacre?

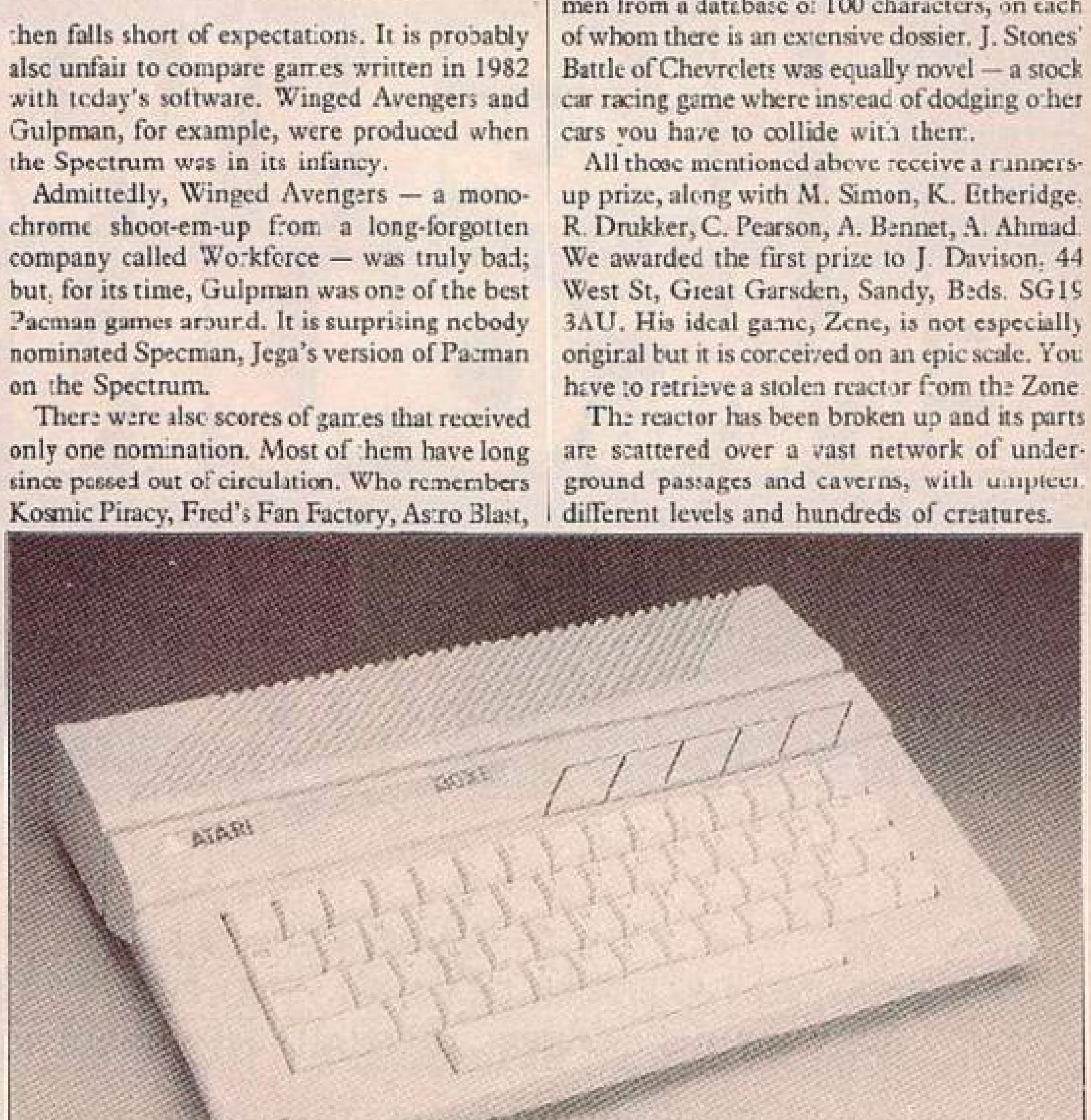
When it came to describing your ideal game for 128K, most of the entries were uninspired. In fact the bank-switched 64K is less of an advantage than you might think. It is unlikely that many software houses will write games which fully exploit the Atari's 128K. If they do use the extra memory it will be to store text and screen data rather than the game code itself.

This was the direction that most of the entries took: they wanted to see adventures with more locations and more graphics, and platform games with yet more screens. M. Topping suggested a follow-up to Elite with an adventure game element, in which you leave your ship and explore space stations. N. Smith thought that 128K would be sufficient to stage a text and graphics version of Lord of the Rings.

Rather different was S. Patel's idea for a game called Father. In this, a boy has lost his father and has to find him by asking the computer questions about three possible candidates. The program needs 128K since it chooses the three men from a database of 100 characters, on each of whom there is an extensive dossier. J. Stones' Battle of Chevrolets was equally novel — a stock car racing game where instead of dodging other cars you have to collide with them.

All those mentioned above receive a runners-up prize, along with M. Simon, K. Etheridge, R. Drukker, C. Pearson, A. Bennet, A. Ahmad. We awarded the first prize to J. Davison, 44 West St, Great Garsden, Sandy, Beds. SG19 3AU. His ideal game, Zone, is not especially original but it is conceived on an epic scale. You have to retrieve a stolen reactor from the Zone.

The reactor has been broken up and its parts are scattered over a vast network of underground passages and caverns, with umpteen different levels and hundreds of creatures.

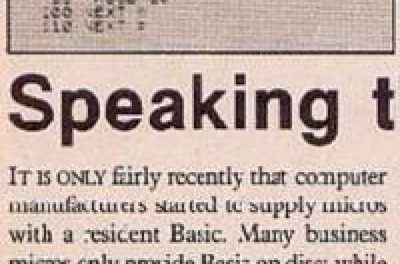


I could do that...

Never mind the text books — bolt-on programming is here to stay according to John Ransley, and here's your chance to prove that the unstructured approach can be effective, if not always particularly elegant, and earn yourself this month's First Bytes £15 program prize.

We want you to devise a short program that combines a loop and several uses of Gotos and/or Gosubs; the targets of which can be simple one-line statements rather than elaborate modules. Your purpose should be simply to effectively demonstrate some of the principles touched upon in John Ransley's article rather than produce a spectacular screen show.

In July we set readers the task of creating an animated display by Poking to screen memory. The £15 prize goes to Martin Wright, 2 Rye Lane, Halifax, HX2 0QD. Apart from demonstrating the complexities of the Spectrum's display file, the program also shows that Poking to the screen is usually slower than printing.



BEGINNERS *first bytes*

Starting out in home computing? First Bytes is for you. Just write to *Your Computer* with any hardware or software problems, no matter how small or simple.

A bluffers' guide to micros



OF COURSE, there is always a danger that you will fall prey to the belief which prevails amongst outsiders to the computer fraternity that there is actually some reason for having a home micro. The half-hearted justification for originally buying a micro range from "it's important to keep abreast of new technology" to "it's important for the kids — computers are so important in education now."

These original excuses might be followed by a desire to make the micro of some use in the real world — hence the plethora of books which purport to show you how you can calculate the amount of wallpaper needed for the living room, shopping lists, telephone directories, television directories(!), freezer stock lists, calendars, bank statements, measurement conversion programs, car maintenance file, gas and electricity bills, VAT.

No-one in their right mind believes that switching a computer on, plugging it into the telly, loading a cassette or a disc and then accessing a file is any quicker than doing the calculation on the back of a bubblegum packet in the traditional way.

It just looks more efficient, and the hopelessly crazed user probably derives some tactile satisfaction from the use of the micro. Some people may regard this as unduly cynical — and as software for household book-keeping becomes more sensible and user-friendly perhaps people really will start filing bills on their home computer instead of in the wastepaper basket. But it is still camouflage, designed to disguise the fact that the home micro dwells in a realm of sublime abstraction.

The other good piece of camouflage is word processing. Rather like food processing, this is something that enables you to combine formerly discrete and interesting items into a bland tasteless mush. Everyone knows that word-processing makes it really easy to change paragraphs around in what you have written. You can just play with the text on the screen. You just scroll through the text, mark the paragraph you want to shift, scroll back, mark where you want it shifted to and give the order to shift it. Then you check through the text and find that because you forgot to mark the end of the paragraph you wanted copied nothing happens.

So you go back and mark the paragraph properly. The text is moved successfully. But don't forget to scroll back through the text and delete the marks relating to moving the paragraph about or the computer will get very confused. So far so good. Now all you have to do is print it out — that is, set the parameters on the printer, make sure you cleared the buffer if you've just been printing something out, maybe tell it to number the pages, and untangle the printout when it jams in the printer.

We are told that this is easier than buying a cheap typewriter and some Tippex, but realise that word processing serves two purposes. One, it disguises the abstract nature of the computer, and, two, it makes the writing process more interesting by substituting a whole new order of mistakes to make under the guise of dealing with human error.

Paul Bond

Speaking the right language is half the battle

IT IS ONLY fairly recently that computer manufacturers started to supply micros with a resident Basic. Many business micros only provide Basic on disc; while Apple's Macintosh comes without any high-level language, Basic or otherwise.

For home computer owners there is clearly an advantage to having Basic in Rom — it is instantly available as soon as the machine is turned on. But it also has its drawbacks. Unless you can switch the Basic Rom out — as on the BBC and the Amstrad — it takes up memory space even when it is not in use.

This means that other language interpreters or compilers must load into the area normally reserved for programs. More generally, resident Basic makes owners less likely to consider trying other languages.

There is much to be said for using an alternative language to Basic. For one thing, if it is a compiled language it will run much faster. Almost all home computers use Basic interpreters which take a program line at a time, translate it, and then execute it. Compilers, by contrast, translate high-level language programs into machine code before they are run. The resulting "object code" may not be as efficient as hand-crafted machine code but it is still substantially quicker than an interpreted program.

Apart from speed, there are other reasons why you should consider an alternative language. It is a matter of horses for courses: for particular applications some languages are more suitable and easier to write in than Basic. Forth, for example, would be a good language to choose if you wanted to write a program to control a robot arm. It was originally designed for control applications.

Logo supporters will tell you the language is capable of much more than just turtle graphics, and is well suited for list processing or writing database programs. They will even argue that a full version of Logo is more powerful

(continued on next page)

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than Basic.

Pascal demands a rigid program layout in which variables and procedures must be defined at the outset. It encourages disciplined programming with the emphasis on advanced planning and a structured approach. For this reason it is regarded as a sound language with which to teach programming.

If you are looking for a job as a programmer a knowledge of C will stand you in better stead than fluency in Basic. It is currently the most fashionable language around. Most new operating systems are now partly written in C, as are many successful application programs. At the same time as being highly structured, C allows you to get at the guts of a machine in a similar way to assembly language.

These languages are available on most home micros; although, in some cases, they are stripped-down versions such as Small C or Tiny Pascal. Other languages include Basic compilers, Lisp, BCPL, Comal, Prolog, and Cobol.

Each has its strengths and weaknesses; over the next few months we will be telling you what they are, as First Bytes takes a closer look at some of the more important languages.

Chris Lam.

BEGINNERS *first bytes*

Happiness is a thoroughly haywire program!

BEFORE SAVING enough pennies to buy my first computer — and like many other would-be micro owners, I suspect — I enjoyed a sort of voyeuristic love affair with the sylphs of silica city by reading *Your Computer* every month, eventually buying a couple of those early teach-yourself-Basic titles which looked as if they'd come from under the counter in an Old Compton Street bookshop and dealt with their subject just as predictably.

Not much was to be found in them about how to write a Pacman program or devise a neat database utility — instead, chapters on using your computer to work out acreages of carpeting or rivers of paint, or interesting exercises in calculating the fifteenth decimal point of Pi.

If those Puritan-severe tutorials did venture beyond the realm of numbing numeracy, it was only to remind the reader that structured programming was the Right Path Through Life. In other words, any and every program you wrote was bound to be interpreted as an algorithm in the form of program steps presented in strict chronological order of execution, branching or non-execution. Further, that even sparing use of subroutines was not only a sign of a snivelling surrender to convenience on the part of the programmer but was guaranteed to ensure that, worse, he would never be taken seriously by anyone who knew better.

Such counsel was enough either to send you rushing out to buy one of those plastic templates full of skewiff geometric shapes or force you into becoming a closet algorithmic anarchist — joyously peppering your programs with Gotos and Gosubs no matter what the consequences. In fact, such apparently irresponsible behaviour is but a sign that, programming-wise, you've grown up.

I'd like to find the guy who dreamt up the phrase "structured programming" because he has much to answer for. Not least, for the souls who have fallen at the wayside endeavouring to follow his cretinous creed, because trying to structure a computer program is like attempting to water-ski on blancmange — it's possible to do it but decidedly less invigorating than the alternative.

While professional programmers find that it's not a bad idea to scribble down their first thoughts on paper and to conceive of their implementation as a series of modules, from there on in it's usually a case of keyboard creation — with the finished program actually building on screen before their eyes and with not a plastic template in sight.

One of the arguments made in favour of the structured approach is that it makes it easy for anyone — including the author, even months later — to fathom out how the program works. So whatever happened to Rems? I bung a Rem in practically every other line of any program I'm developing, and Save a "library" copy of it with them intact.

I may knock them out to gain a little more speed and memory in the working copy — but even that's not necessary if one intends to produce a compiled version, because utilities such as the excellent Jetpack from Dataview Wordcraft automatically ignore all Rems anyway.

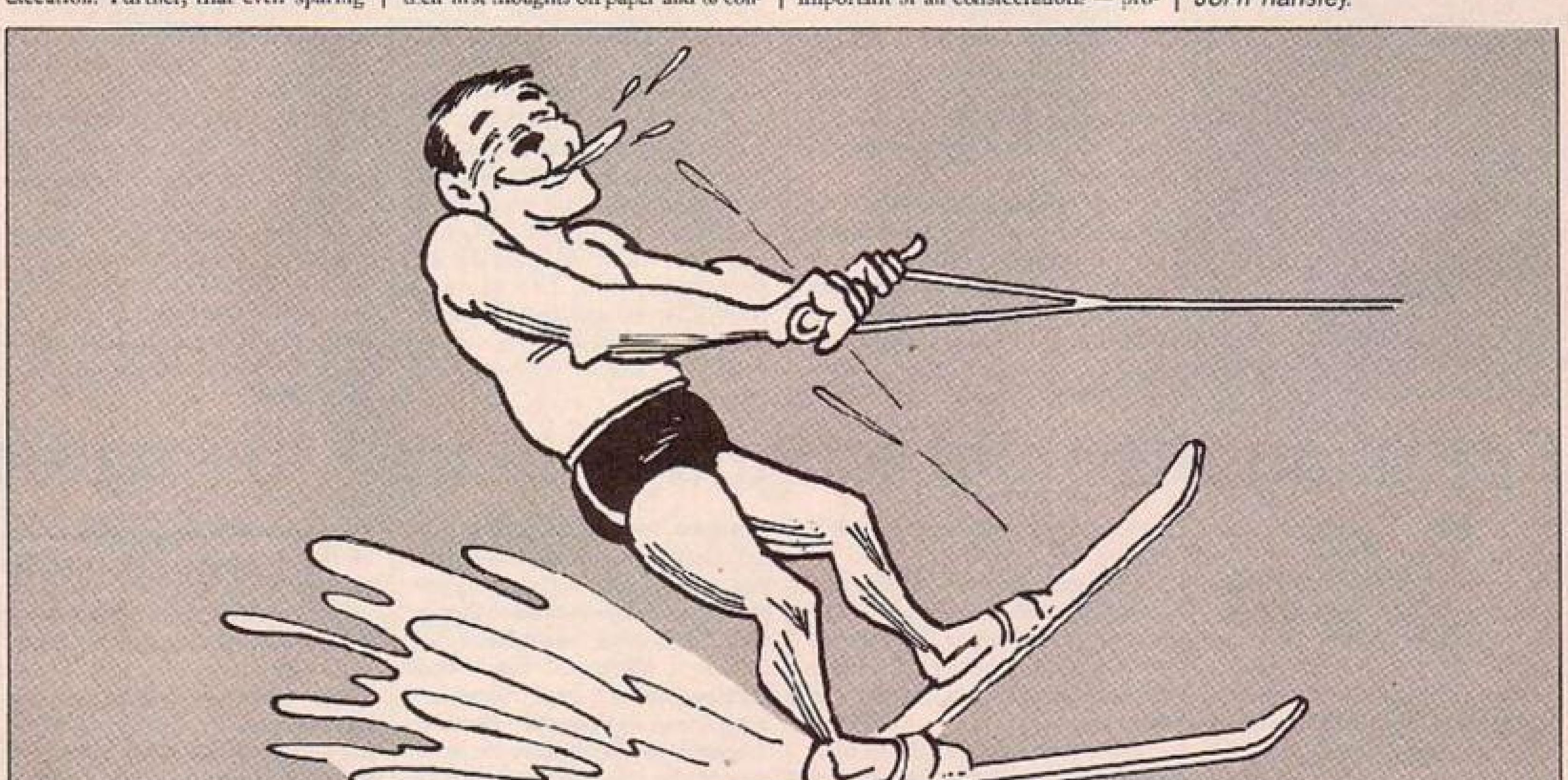
Another so-called advantage of the SP approach is that it makes for tidier programs. Are you tidy? Is Bob Geldof? Is the molecular structure of the Taj Mahal? Next question.

The algorithmics also lose hands down when it comes to usually the most important of all considerations — program execution speed. Particularly in games writing, you need to keep to the absolute minimum the number of lines contained within the primary loop: that used to test for keyboard or joystick inputs. Avoid preceding that loop with a chunk of program to set up, for example, the game's playfield design, user-defined characters and/or sprites and go instead for a single Gosub to a module beginning at a much higher line number.

This is because any Return or Goto usually forces a laborious count beginning at the very first line used all the way up to that which the Return logic or Goto dictates is the next to be executed.

Thus you should aim at starting the 'active' part of your program at the lowest line number possible and at keeping the loop itself short and sweet. Delaying the first and prolonging the second, as the structuralists would have you do, will result in a program that runs as fast as a concrete rabbit. Psst! Anyone wanna buy a programmer's template with a possible secondary application in cutting out marzipan shapes for *petit fours*?

John Ransley.



TOP★ TIPS

SCREEN FLIPPER

This is a machine code routine for the 48K Spectrum that creates a flipped mirror image of any screen, taking into consideration the colour attributes.

First type in the Basic program and run it. If you get the message "LOADING IS OK" then save the routine by typing SAVE"FLIP"CODE 30000,140

Now the routine is ready to work, all you have to do is to load any screen and then type RANDOMISE USR 30000.

Hany Kilany.

```
  3 LET COUNT=0
  5 FOR N=30000 TO 30135
 10 READ A: POKE N,A
 15 LET COUNT=COUNT+A
 30 NEXT N
 40 IF COUNT<>18546 THEN GO TO 60
 50 GO TO 100
 60 CLS : PRINT AT 8,7; FLASH 1;"ERROR IN DATA": BEEP 1,20: STOP
100 CLS : PRINT AT 8,2; PAPER 2; INK 7; FLASH 1;"LOADING OK"
110 PRINT AT 12,4; PAPER 6; INK 0;"NOW RUN TYPE"
120 PRINT AT 14,5; FLASH 1; INVERSE 1;"RANDOMISE USR 30000"
130 NEXT N
1000 DATA 33,54,256,[illegible]
1010 DATA 235,[illegible]
1020 DATA [illegible]
```

SOUND OFF

This is a short program written on a BBC 1.2 OS which is extremely useful when playing games late at night. Load beforehand and then press @ to disable the sound or P to bring it back — even when the game is in progress. It works on Planetoid, Killer Gorilla, Snapper, Hopper and hopefully all games not using &A00-&AFF.

Type in the program. Run it to assemble then "Save "name" A00 A41. To use *Load, CALL &A00 then load your game as normal. Press @ when your mother tells you to turn it off and P when she's gone back to sleep.

T. J. Powell.

```
10P%=&A00
20[
30CLD LDA#7:JSR&FFEE
40LDX#2:LDA#14:JSR&FFF4
50LDA#&19:STA&220:LDA#&0A:STA&221
60RTS:BRK:CLD
70PHA:TXA:PHA:TYA:PHA:PHP
80CMP#64:BNE &A20
90LDX#9:LDY#7:LDA#&D2:JSR&FFF4
100CMP#80:BNE &A3A
110LDX#1:LDY#1:LDA#&D2:JSR&FFF4
120PLP:PLA:TAY:PLA:TAX:PLA:RTS
130]
```

RESPONSE Frame

Do you have a problem related to your micro? Tim Hartnell will do his best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you'd like to pass on to others. Why not write to us with your top tips?

IS ACE OK?

I have recently been offered a secondhand Jupiter Ace for £25. Should I buy it? I would like to learn Forth and this seems as good a way as any to make a start. Is it possible to still buy software and peripherals for the Ace?

L. Quintran,
London E9.

IT IS MUCH more convenient to use the Ace than to have to load in a Forth from tape every time you wish to work with the language, so it seems a worthwhile purchase in order to help you learn Forth.

A L Rogers informs me that Boldfield Computing Ltd., Sussex House, Hobson Street, Cambridge — telephone Romsey (0487) 840740 — currently sell the Ace, and have produced 11 original software packages for it. They also sell the original 16K pack, and also a 48K Ram as well as an add on keyboard.

RANDOM NUMBERS

Could you please tell me how to simulate a random number function in machine code on my Commodore computer?

Hans-Erik Foyyd,
Flipstad,
Sweden.

THIS IS far from simple to do. You could call the random number routine in the Basic Rom when you need a number, or store a set of random numbers — called from the Rom routine — and then access them as you need them. Another way, which would be a bit of a "fudge" but will work well in practice, is to get the random numbers you need while you are still in Basic, before you go into machine code.

That is, you set up a table of random numbers — as many as you will need in the program — and then Poke them into memory, before executing the SYS command to go into machine code. These numbers can then be accessed as and when they are required during the running of the program.

GAME CHALLENGE

I own a Vic-20 with 16K expansion. I like adventure programs, but have found little challenge in most of those I have tried. Those I own include *Dungeons, the Dark Dungeons, Mysterious Island* and *The Curse of the Werewolf*. This last one was the only game which I found hard to do, and it took me several weeks to get in and around the castle. Could you please recommend another adventure game which is harder to crack that most others, and keeps you wanting more. I do not mind if it is text or graphics?

M. Butterworth,
Bacup,
Lancashire.

THE SCOTT ADAMS adventures, such as the very tricky *Voodoo Castle*, have proved very popular. They are difficult programs to solve. They also have the advantage of having "skill levels" printed on the packaging, so you can choose programs of a difficulty level which suits you.

8-BIT MICROS

Most home computers use an 8-bit processor, yet many of these have 64K memories, which would demand 'it seems to me' 16 bits — two raised to the 16th power equals 64K. How can an 8-bit computer address this amount of memory?

I.C. Bishop,
Ely,
Cardiff.

AN 8-BIT computer *transfers* data 8 bits at a time. This has nothing to do with how much memory the computer can address. The addressable memory is limited by the *address bus* which, on an 8-bit computer, is 16 bits wide, thus allowing it to address 64K.

CORRUPTION

I very often design my own title pages for programs listed in computer books, but I am experiencing a little problem. To brighten up the display, I use:

POKE 645,RND(1)*6

to produce a flashing effect. But when I use this with a program which contains sprites and graphics, the program works but the graphics are corrupted. Could you possibly suggest a way I could overcome this problem?

J A Quintin,
Norwich.

THE POKE YOU are using simply changes the colour of the cursor — and therefore changes, character by character, the colour of the material you're printing in text on the screen. However, I cannot see how Poking this address could possibly "corrupt" other graphics.

The best way to isolate the problem would be to do your random colour changes by having the colour controls within a string, a section of which is selected at random — using Mid$ — and print it before each character is printed. If your corruption still occurs, it could well be a machine fault.

KEY TO ACCESS

I would like to know how to access more than one key at a time on the Commodore 64. I am writing a machine-code polyphonic organ program, and I cannot find any literature which will enable me to play chords. Can you help?

L Meek,
Garrowhill,
Glasgow.

UNFORTUNATELY, IF you press two keys at once on the 64, the computer will only read the one with the highest priority. There are only three keys which return values at the same time as other keys are being read. These are the Control, Shift and Commodore keys. The state of these keys is held in location 653.

If Shift is pressed

PEEK(653) AND 1

will return 1 — 0 if not pressed; if Control is pressed

PEEK(653) AND 2

will return 2; and if the Commodore key is held down

PEEK(653) AND 4

will return 4.

PEEK(653) AND 7

will test all three.

MORE RAM ROOM

I have a BBC Micro with a disc interface attached. I have written several programs which just about cause it to run out of memory. I am afraid that if I try to develop them further, I definitely will run out of Ram. Is there a way of "disconnecting" the interface, using software, to free up the most possible room for my programs?

David Johansor,
London W4.

IF YOU type in:

PAGE=&1200

you'll find you get an additional 1.75K. Although you can still use your disc system, your *cannot* open disc files — that is, you cannot use the Openin command.

SOFTWARE File

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted

Klondike

Brian Fitton,
Bradford,
West Yorkshire.

THIS IS the story of Klondike Bill — you take his part. Bill has arrived in the small town of Fittsville in the Middle West in response to stories of a Gold Strike. He finds himself a plot of land that he can prospect on.

You move him about with the cursor keys 5, 6, 7, 8 and when you decide which square to mine press S. The program will respond by telling you whether there is gold there or not; if there is you have a choice, mining it or not. The screen then changes to show the level indicators which show your current status and at the bottom of the screen a pointer which traverses left and right by means of the cursor keys 5 and 8 and points to a type of icon instead of the more usual menu.

You must ensure that the Energy level is kept high, the fatigue level low, the Food level high, and the hunger level low.

You may convert gold to cash any time, and you may also buy food providing you have enough cash to do so.

The variables for the initial levels are held in line 35 and can be altered as you wish, they are a=Fatigue, b=Food, c=Cash, d=Energy, e=Gold, f=Hunger.

The graphic characters are as follows:

LINE 75 "AC" "BD" "EG" "FH". LINE 365 Each one is shifted graphic three twice. LINE 450 is "N". LINE 475 is "K" "I" "J" "L" "M" "O". Line 480 is shifted Graphic 8. LINE 690 are unshifted Graphic 3 eight times, shifted Graphic 5, unshifted Graphic 5 and shifted Graphic 3 eight times. LINE 710 is the same +1 LINE 900 is "AC" "BD" "EG" "FO". LINE 910 is "AC" "BD" "EG" "PH".

```
   0 REM © Brian Fitton 13/4/85
           211 LYNFIELD DRIVE
           HAWORTH ROAD
           BRADFORD BD9 6FY
   1 CLEAR 55366: POKE 23658,8:
FOR z=0 TO 6: PRINT AT z,8; INK
2;"K L O N D I K E": BEEP .05,-2
0: NEXT z: FOR z=7 TO 14: PRINT
AT z,9; INK 3; BRIGHT 1;"STOP TH
E TAPE": BEEP .05,-25: NEXT z: F
OR z=15 TO 21: PRINT AT z,8; INK
 2;"K L O N D I K E": BEEP .06,-
30: NEXT z
   2 FOR z=0 TO 300: NEXT z: CLS
: PRINT AT 10,1;"DO YOU WANT IN
STRUCTIONS (Y/N)?": PAUSE 0
   3 IF INKEY$="Y" THEN GO TO 5
   4 IF INKEY$="N" THEN GO TO 17
   5 CLS : LET O$="            INS
TRUCTIONS": GO SUB 790: PLOT 78,
167: DRAW 100,0: FOR z=0 TO 200:
 NEXT z: CLS
   6 LET O$="  This is the story
 of Klondike  Bill. You take the
 part of he.  Bill has arrived i
n the small   town of Fittsville
 in the       middle west in res
ponse to      tales of a Gold St
rike, and     finds himself a pl
ot of land    that he can Prospe
ct on.": GO SUB 790
   7 LET O$="            You move Kl
ondike Bill around   the screen
by the cursor keys   5,6,7 & 8 a
nd select a square   which you t
hink may be worth    mining, the
n press  S" the      program wil
l respond by telling you wether
their is Gold there  or not, you
 then have a choice  of mining o
r not.          You are then presen
ted with the Level   Indicators
which show your      Current Sta
tus and at the       bottom of t
he screen a type of  Icon in pla
ce of a Menu.": GO SUB 790
   8 PRINT #1;"    Press any key
to Continue": PAUSE 0
   9 CLS : LET O$=" Follow the I
nstructions given at the bottom o
f the Screen i.e.    use key 5 to
 move the pointer    to the left
and key 8 to the     right, '5' a
gain selects your    Choice.
                     You must ens
ure that the Energy  Level is kep
t high, the Fatigue  Level is kep
t low, the Food      Level is kep
t high, and the      Hunger Level
 is kept low.        The other tw
o levels are Gold    and Cash. Yo
u may convert any    Gold you fin
d into cash at any   time. You ar
e also able to buy   food providi
ng you have enough   cash to do s
o.": GO SUB 790
  10 LET O$="
                  GOOD LUCK": GO SUB
 790: PRINT AT 20,3;"PRESS ANY K
EY TO BEGIN OR 'I'   TO READ INS
TRUCTIONS AGAIN": PAUSE 0: IF IN
KEY$="I" THEN GO TO 5
  15 RESTORE : FOR y=USR "a" TO
USR "?"+7: READ x: POKE y,x: NEX
T y
  19 DATA 127,255,225,192,156,13
0,217,201,193,129,128,64,67,65,3
2,30,254,255,135,3,57,65,155,147
,131,129,1,2,194,130,4,6
  20 DATA 108,13?,129,151,16?,16
1,31,30,127,127,63,60,60,50,28,1
26,62,193,129,133,133,133,138,13
6,254,254,252,60,60,60,56,126
  25 DATA 169,17?,251,35,35,33,3
?,35,19?,19?,?54,254,254,130,130
,0,96,112,68,124,100,100,30,72,1
6,108,130,186,152,186,130,124,6
  30 DATA 8,15,40,68,65,65,40,24
,15,55,124,254,124,56,56,36,252,
252,60,126,0,0,0,0,63,63,30,138,
0,0,0,0
  35 LET aa=6: LET bb=13: LET a=
0: LET b=10: LET c=25: LET d=120
: LET e=0: LET f=0: LET dd=19: L
ET ee=13
  40 LET j=a: LET k=b: LET l=c:
LET m=d: LET n=e: LET o=f
  45 BORDER 3: PAPER 6: INK 0: B
RIGHT 1: CLS
  50 PLOT 0,0: DRAW 0,175: DRAW
255,0: DRAW 0,-175
  55 PRINT INK 1; INVERSE 1;AT 2
0,0;" * * * * * * * * * * * * *
 "; INVERSE 0; BRIGHT 0;AT 20,28
;" "
  60 PRINT INK 1; INVERSE 1;AT 2
1,0;" Cursor Keys Move-S Selects
 "; INVERSE 0; BRIGHT 0;AT 21,28
;" "
  65 FOR z=0 TO 19: PRINT AT z,2
8; BRIGHT 0;"    ": NEXT z
  70 LET q=0: FOR g=q TO 200 STE
P 32: FOR p=175 TO 32 STEP -32:
PLOT g,p: DRAW q,-32: DRAW 32,q:
 DRAW -32,q: DRAW q,32: DRAW 32,
q: DRAW q,-32: NEXT p: NEXT g
  75 PRINT INK 2;AT aa,bb;"AC";A
T aa+1,bb;"BD": INK 5;AT aa+2,bb
;"EG"; INK 1;AT aa+3,bb;"FH"
  76 GO SUB 900: FOR z=0 TO 5: N
EXT z: GO SUB 910
  80 IF INKEY$="5" THEN GO SUB 9
00: GO SUB 910: LET bb=bb-4: PRI
NT AT aa,bb+4;"  ";AT aa+1,bb+4
;"  ";AT aa+2,bb+4;"  ";AT aa+
3,bb+4;"  ": IF bb<=1 THEN LET
bb=1
  85 IF INKEY$="8" THEN GO SUB 9
10: GO SUB 900: LET bb=bb+4: PRI
NT AT aa,bb-4;"  ";AT aa+1,bb-4;
"  ";AT aa+2,bb-4;"  ";AT aa+3,b
b-4;"  ": IF bb>=25 THEN LET bb=
25
  90 IF INKEY$="7" THEN GO SUB 9
00: GO SUB 910: LET aa=aa-4: PRI
NT AT aa+4,bb;"  ";AT aa+5,bb;"
  ";AT aa+6,bb;"  ";AT aa+7,bb;"
  ": IF aa<=0 THEN LET aa=0
  95 IF INKEY$="6" THEN GO SUB 9
00: GO SUB 910: LET aa=aa+4: PRI
NT AT aa-1,bb;"  ";AT aa-2,bb;"
  ";AT aa-3,bb;"  ";AT aa-4,bb;"
  ": IF aa>=16 THEN LET aa=16
 100 IF INKEY$="S" THEN GO TO 11
0
 105 GO TO 75
 110 CLS : FOR z=0 TO 9: PRINT P
APER 5;"
           ": NEXT z: INK 3: LET O$
="          S E A R C H I N G
  ": GO SUB 790
 115 BORDER 3: PAPER 6: INK 0: C
LS : PRINT INK 3; INVERSE 1; FLA
SH 1;AT 10,0;"          S E A R C H
 I N G          "
 120 PAUSE 100: GO SUB 585
 125 IF c<-15 THEN LET c=0: LET
l=7
 130 BORDER 6: CLS : LET f=f+1
 135 IF a<=0 THEN LET a=1
 140 IF a>=0 THEN LET j=9
 145 IF f<=0 THEN LET f=1
 150 IF d<=0 THEN LET m=10
 155 IF b<=10 THEN LET k=10
 160 IF c>=15 THEN LET l=10
 165 IF d<=90 THEN LET m=1
 170 IF e<=10 THEN LET n=10
 175 IF f>=1 THEN LET o=0
 180 IF a>=10 THEN LET j=2
 185 IF b<=8 THEN LET k=2
 190 IF c>=140 THEN LET l=8
 195 IF d<=80 THEN LET m=8
 200 IF e>=30 THEN LET n=8
 205 IF f>=3 THEN LET o=7
 210 IF a>=30 THEN LET j=4
 215 IF b<=6 THEN LET k=6
 220 IF c>=300 THEN LET l=6
 225 IF d<=60 THEN LET m=6
 230 IF e>=60 THEN LET n=7
 235 IF f>=5 THEN LET o=5
 240 IF a>=60 THEN LET j=6
 245 IF b<=4 THEN LET k=5
 250 IF c>=500 THEN LET l=5
 255 IF d<=40 THEN LET m=4
 260 IF e>=90 THEN LET n=6
 265 IF f>=6 THEN LET o=3
 270 IF b<=2 THEN LET k=1
 275 IF d<=10 THEN LET m=9
 280 IF a>=150 THEN LET j=1
 285 IF e>=500 THEN LET n=1
 290 IF c>=5000 THEN LET l=1
 295 IF b=0 THEN LET O$=" YOU HA
VE RUN SHORT OF FOOD !!!!": GO S
UB 790: FOR z=0 TO 200: NEXT z:
GO TO 735
 300 PRINT AT 0,1;"E";AT 1,1;"N"
;AT 2,1;"E";AT 3,1;"R";AT 4,1;"G
";AT 5,1;"Y"
 305 PRINT AT 0,6;"F";AT 1,6;"A"
;AT 2,6;"T";AT 3,6;"I";AT 4,6;"G
";AT 5,6;"U";AT 6,6;"E"
 310 PRINT AT 0,11;"G";AT 1,11;"
O";AT 2,11;"L";AT 3,11;"D"
 315 PRINT AT 0,16;"C";AT 1,16;"
A";AT 2,16;"S";AT 3,16;"H"
 320 PRINT AT 0,21;"F";AT 1,21;"
O";AT 2,21;"O";AT 3,21;"D"
 325 PRINT AT 0,26;"H";AT 1,26;"
U";AT 2,26;"N";AT 3,26;"G";AT 4,
26;"E";AT 5,26;"R"
 330 PRINT OVER 1;AT 11,2;d;AT 1
1,7;a;AT 11,11;INT e;AT 11,16;c;
AT 11,22;b;AT 11,28;f
 335 PLOT 6,78: DRAW 0,96
 340 PLOT 46,78: DRAW 0,96
 345 PLOT 86,78: DRAW 0,96
 350 PLOT 126,78: DRAW 0,96
 355 PLOT 166,78: DRAW 0,96
 360 PLOT 206,78: DRAW 0,96
 365 PRINT INK 1;AT m,2;"--"; IN
K 2;AT j,8;"--"; INK 4;AT n,13;"
--"; INK 0;AT l,18;"--"; INK 5;A
T k,23;"--"; INK 3;AT o,28;"--"
 370 PLOT 6,78: DRAW 240,0: DRAW
 0,96
 375 IF c<=0 THEN CLS : FOR z=0
TO 10: PRINT PAPER 6;"
           ": NEXT z
: LET O$="UNFORTUNATELY YOU HAVE
NO CASH  ": GO SUB 790: FOR z=0
TO 200: NEXT z: GO TO 735
 380 IF a>=100 THEN PAUSE 100: C
LS : PRINT : PRINT : PRINT : LET
 O$="YOU ARE TOO FATIGUED TO CON
TINUE": GO SUB 790: FOR z=0 TO 2
00: NEXT z: GO TO 735
 385 IF d<=0 THEN PAUSE 100: CLS
 : PRINT : PRINT : PRINT : LET O
$=" YOU HAVE NO ENERGY TO CONTIN
UE ": GO SUB 790: FOR z=0 TO 200
: NEXT z: GO TO 735
 390 IF e>=9999 THEN PAUSE 100:
CLS : PRINT : PRINT : PRINT : LE
T O$=" YOU HAVE MORE THAN ENOUGH
 GOLD    LET SOMEONE ELSE HAVE A
 GO": GO SUB 790: FOR z=0 TO 200
: NEXT z: GO TO 735
 395 IF c>=9999 THEN PAUSE 100:
CLS : PRINT : PRINT : PRINT : LE
T O$=" YOU HAVE MORE THAN ENOUGH
 CASH    LET SOMEONE ELSE HAVE A
 GO": GO SUB 790: FOR z=0 TO 200
: NEXT z: GO TO 735
 400 IF f>=10 THEN PAUSE 100: CL
S : PRINT : PRINT : PRINT : LET
O$=" YOU HAVE ALLOWED YOUR HUNGE
R      TO REACH TOO HIGH A LEVEL
    ": GO SUB 790: FOR z=0 TO 20
0: NEXT z: GO TO 735
 405 PRINT INK 1; BRIGHT 1; INVE
RSE 1;AT 13,1;"L E V E L   I N D
I C A T O R S"
 410 PRINT AT 15,1;"Mine";AT 15,
6;"Eat";AT 15,11;"Rest";AT 15,16
;"Buy";AT 15,21;"G-C";AT 15,26;"
End"
 415 PRINT INK 3;AT 21,0;" <<5
    'S' Selects      8>>>"
 420 PLOT 5,41: DRAW 30,0: DRAW
-15,-15: DRAW -15,15
 425 PLOT 45,41: DRAW 30,0: DRAW
-15,-15: DRAW -15,15
 430 PLOT 85,41: DRAW 30,0: DRAW
-15,-15: DRAW -15,15
```

```
 435 PLOT 125,41: DRAW 30,0: DRA
W -15,-15: DRAW -15,15
 440 PLOT 165,41: DRAW 30,0: DRA
W -15,-15: DRAW -15,15
 445 PLOT 205,41: DRAW 30,0: DRA
W -15,-15: DRAW -15,15
 450 PRINT INK 3;AT dd,ee;"N"
 455 IF INKEY$="5" THEN LET ee=e
e-1: PRINT AT dd,ee+1;" ": IF ee
<=2 THEN LET ee=2
 460 IF INKEY$="8" THEN LET ee=e
e+1: PRINT AT dd,ee-1;" ": IF ee
>=27 THEN LET ee=27
 465 IF INKEY$="8" THEN GO TO 45
0
 470 PLOT 0,15: DRAW INK 3;230,0
 475 PRINT AT 17,2;"K";AT 17,7;"
I";AT 17,12;"J";AT 17,17;"L";AT
17,22;"M";AT 17,27;"O"
 480 PRINT INK 3;AT 19,1;"█";AT
19,29;"█"
 485 BEEP .02,RND*30: GO TO 450
 490 IF ee<=2 THEN RESTORE : LET
ee=15: GO TO 45
 495 IF ee<=7 THEN LET ee=15: GO
TO 525
 502 IF ee<=12 THEN LET ee=15: G
O TO 710
 501 IF ee>=13 AND ee<=16 THEN G
O TO 450
 505 IF ee<=17 THEN LET ee=15: G
O TO 795
 513 IF ee<=22 THEN LET ee=15: G
O TO 795
 515 IF ee<=27 THEN LET ee=15: G
O TO 805
 520 BEEP .02,RND*30: GO TO 400
 525 LET r=INT (RND*13)
 532 IF r<=5 THEN GO TO 550
 535 CLS : FOR z=0 TO 9: PRINT P
APER 6;"
                ": NEXT z: LET O$="
FOOD O.K.  NICE MEAL": GO SUB 79
0: FOR z=0 TO 100: NEXT z
 540 LET f=f-3: LET b=b-1: LET a
=a-15
 545 GO TO 130
 550 CLS : FOR z=0 TO 9: PRINT P
APER 6;"
                ": NEXT z: LET O$="
FOOD IS BAD TRY AGAIN": GO SUB 7
90
 555 FOR z=0 TO 100: NEXT z: LET
b=b-1: GO TO 130
 560 LET r=INT (RND*10)
 565 FOR z=0 TO 100: NEXT z
 570 IF r<=5 THEN GO TO 585
 575 LET a=a+15: LET d=d-5
 580 GO TO 130
 585 LET r=INT (RND*10)
 590 IF r<=4 THEN GO TO 610
 595 CLS : FOR z=0 TO 10: PRINT
PAPER 5;"
                ": NEXT z: LET O$="
BAD LUCK NO GOLD HERE
     TRY AGAIN": GO SUB 790
 600 FOR z=0 TO 100: NEXT z
 605 LET a=a+15: LET d=d-10: GO
TO 130
 610 LET i=INT (RND*40)
 615 LET g=INT (RND*25)
 620 LET h=INT (RND*60)+aa-bb
 625 CLS : PRINT : PRINT INK 0:
LET C$="     CONGRATULATION'S
    ": GO SUB 790: INK 0: PR
INT : PRINT : LET O$=" You have
Discovered some Gold ": GO SUB 7
90
 630 PRINT AT 8,2;" Quantity :";
h;" Ounces"
 635 PRINT AT 10,2;" Quality   "
 640 IF g>1 AND g<8 THEN PRINT A
T 10,13;g;"  Fair"
 645 IF g>9 AND g<20 THEN PRINT
AT 10,13;g;" Very Good"
 650 IF g>=20 THEN PRINT AT 10,1
3;g;" Rich Seam"
 655 IF g<=1 THEN PRINT AT 10,13
;g;" Very Poor"
 660 PRINT : PRINT : PRINT : LET
O$="    Difficulty level : ": G
O SUB 790: PRINT AT 14,23;i/2+g
 665 PRINT : PRINT : LET O$=" DO
 YOU WISH TO MINE HERE (Y/N)?":
GO SUB 790
 670 PAUSE 0
 675 IF INKEY$="Y" THEN GO TO 69
0
 685 LET a=a+10: LET d=d-10: GO
TO 130
 690 CLS : PRINT INK 2;AT 8,13;"
MINING"; INK 7;AT 9,12;"██████
";AT 8,12;"█";AT 8,19;"█";AT 7,1
2;"████████": PRINT : PRINT : LE
T O$="        PLEASE BE PATIENT"
: GO SUB 790: FOR z=0 TO 200: NE
XT z: LET a=a-INT ((i/10)+(h/g))
 695 LET d=d-15
 700 LET e=e+(h*g)
 705 FOR z=0 TO 100: NEXT z: GO
TO 130
 710 CLS : PRINT INK 7;AT 7,11;"
████████";AT 8,11;"█";AT 8,19;"
█";AT 9,11;"████████"; INK 2;AT
8,12;"RESTING": LET r=INT (RND*
10)
 715 FOR z=0 TO 100: NEXT z
 720 IF r<=5 THEN GO TO 730
 725 PRINT : PRINT : LET O$=" UN
FORTUNATELY YOU WERE UNABLE
    TO REST VERY WELL": GO SUB 7
90: LET a=a+10: LET d=d-15: FOR
z=0 TO 100: NEXT z: GO TO 130
 730 PRINT : PRINT : LET O$="
     YOU RESTED WELL": GO SUB 79
0: LET d=d+10: LET a=a-25: FOR z
=0 TO 100: NEXT z: GO TO 130
 735 CLS : PRINT : LET O$="
     TOTAL SCORES  ": GO SUB 790
 740 PLOT 77,158: DRAW 100,0
 745 PRINT : PRINT : LET O$="ENE
RGY   ": GO SUB 790: PRINT a: PAU
SE 10: LET O$="FATIGUE ": GO SUB
 790: PRINT a: PAUSE 10: LET O$=
"GOLD    ": GO SUB 790: PRINT e:
PAUSE 10: LET O$="CASH    ": GO
SUB 790: PRINT c: PAUSE 10: LET
O$="FOOD    ": GO SUB 790: PRIN
T b: PAUSE 10: LET O$="HUNGER  "
: GO SUB 790: PRINT f
 750 PLOT 0,90: DRAW 96,0: PRINT
: PRINT : PRINT "TOTAL    ";d+a+
e+c+b+f
 755 LET hs=d+a+e+c+b+f
 760 PLOT 0,18: DRAW 255,0: PLOT
0,38: DRAW 255,0: PAUSE 100
 765 PRINT : PRINT : PRINT : PRI
NT : PRINT : PRINT : LET O$="DO
YOU WISH TO TRY AGAIN (Y/N)": GO
 SUB 790
 770 PRINT : PRINT : PRINT : PRI
NT "      HIGH SCORE = ";hs: PA
USE 0
 775 IF INKEY$="Y" THEN RESTORE
: RUN
 780 IF INKEY$="N" THEN BRIGHT 0
: BORDER 7: PAPER 7: INK 0: CLS
: STOP
 785 LET c=c+INT e*3: LET e=0: F
OR z=0 TO 200: GO TO 130
 790 LET Z=NOT PI: LET U=NOT Z:
FOR I=U TO LEN O$: PRINT O$(I);:
 BEEP .02,CODE O$(I)-60: NEXT I:
 RETURN
 795 CLS : FOR z=0 TO 10: PRINT
PAPER 5;"
                ": NEXT z: LET O$="YOU
MAY BUY FOOD IN UNITS OF 10": GO
 SUB 790: PAUSE 25: PRINT : PRIN
T : LET O$="HOW MANY UNITS WOULD
 YOU LIKE ?": GO SUB 790: INPUT
un: IF c=0 OR c<=0 THEN GO TO 37
5
 800 LET b=b+un*10: LET c=c-un*2
0: GO TO 130
 805 BORDER RND*6: PAPER RND*5:
INK RND*6: BRIGHT RND*1: FLASH R
ND*1: CLS : PRINT AT 10,4;"ARE Y
OU SURE  YES or NO": BEEP .02,(R
ND*25)+1
 810 IF INKEY$="N" THEN FLASH 0:
 BRIGHT 0: RESTORE : GO TO 45
 815 IF INKEY$="Y" THEN BORDER 7
: PAPER 7: INK 0: FLASH 0: BRIGH
T 0: CLS : STOP
 820 GO TO 805
 900 PRINT INK 2;AT aa,bb;"AC";A
T aa+1,bb;"BD"; INK 6;AT aa+2,bb
;"EG"; INK 1;AT aa+3,bb;"FO": BE
EP .03,-50: RETURN
 910 PRINT INK 2;AT aa,bb;"AC";A
T aa+1,bb;"BD"; INK 6;AT aa+2,bb
;"EG"; INK 1;AT aa+3,bb;"FH": BE
EP .05,-50: RETURN
```

Battleground

Brian Fitton,
Bradford,
West Yorkshire.

Spectrum

AN ARMY HAS landed on the beach from the ships in the background and is advancing towards you. You command a machine gun post at the bottom of the screen and it is your duty to defend it at all cost.

You are able to traverse across the bottom using keys Z left and X right and fire using the space-bar. The enemy and the centre ship fire back at you. The game uses a short machine code routine for the sound effects so do not run it until the code is in memory.

First type in the main Basic listing and Save as "B — Ground" Line 1. Then type in the machine code listing run it and if there are no errors Save it as "B — Code" Code 32500,192. If an error occurs during running insert a pause of 50 in the program after Print b; "="; Peek b: and before Next b. This will slow it down and you will be able to check the Data numbers.

The graphics used in Battleground are: LINE 80 'K'. LINE 90 'L'. LINE 100 'B' 'C' as in 110 and 120 LINE 130 'J'. LINE 150 'BBB'. LINE 260 'B' LINE 270 'C' LINE 940 a $='A' x 10 as in b $, c $, d $. LINE 980 is 'I' and underneath is 'FGH'. Line 1030 e $ = 20 spaces.

To get line 60, go into E mode and press key 5, the background to the line will then be cyan. Go into E mode and press key 7 when the line is finished.

The Basic listing.

```
   0 REM © Brian Fitton Jan.1985
           21 Whinfield Drive
           High Ash Road
           Bradford BD9 6EY
  10 CLEAR 32499: LOAD ""CODE
  20 BORDER 7: PAPER 7: INK 0: C
LS : GO SUB 360
  30 BORDER 5: PAPER 5: CLS
  40 FOR x=0 TO 2: PRINT PAPER 5
;AT x,0;"
                ": NEXT x
  50 FOR x=2 TO 20: PRINT PAPER
6;AT x,0;"
                ": NEXT x
  60 PRINT #1;"      B A T T L E G
R O U N D"
  70 GO TO 150
  80 FOR c=af+2 TO 12 STEP 1: PR
INT INK 0; PAPER 6;AT c,a+3;"K":
 RANDOMIZE USR 32663: PRINT PAPE
R 6;AT c,a+9;CHR$ 128: NEXT c
  90 FOR c=af+12 TO 18 STEP 1: P
RINT INK 0; PAPER 6;AT c,a+6;"L"
: RANDOMIZE USR 32663: PRINT PAP
ER 6;AT c,a+9;CHR$ 128: NEXT c:
RETURN
 100 FOR y=85 TO 30 STEP -1: POK
E 23675,y: PRINT INK 3; PAPER 6;
AT 19,e;"B";AT 20,e;"C": NEXT y:
 POKE 23675,88: RETURN
 110 IF INKEY$="Z" AND e>1 THEN
PRINT PAPER 6;AT 19,e;" ";AT 20,
e;" ": LET e=e-1: PRINT PAPER 6;
AT 19,e;"B";AT 20,e;"C": GO TO 1
40
 120 IF INKEY$="X" AND e<30 THEN
 PRINT PAPER 6;AT 19,e;" ";AT 20
,e;" ": LET e=e+1: PRINT PAPER 6
;AT 19,e;"B";AT 20,e;"C": GO TO
140
 130 IF INKEY$=" " THEN LET z=e*
8+3: PLOT OVER 1;z,24: DRAW INK
9; OVER 1;0,115: PRINT INK 6; PA
PER 6;AT 18,e;"J": RANDOMIZE USR
 32639: PLOT OVER 1;z,24: DRAW O
VER 1;0,115: PRINT PAPER 6;AT 18
,e;" ": LET x=1
 140 RETURN
 150 PRINT AT 21,17;"BBB"
 160 PLOT 138,3: DRAW 18,0
 170 GO SUB 1050
 180 PRINT INK 1; PAPER 6;AT ab,
a;a$: BEEP .01,1
 190 PRINT INK 2; PAPER 6;AT ac,
a;b$
 200 PRINT INK 0; PAPER 6;AT ad,
a;c$
 210 PRINT INK 3; PAPER 6;AT ae,
a;d$
 220 PRINT AT af,a;f$
 230 PRINT INK 0;AT 21,0;"SCORE:
";AT 21,11;"LIVES:";AT 21,22;"LE
VEL:"
 240 PRINT AT 21,6;sc;AT 21,28;h
 250 IF ae>14 THEN BEEP .03,ae
 260 PRINT PAPER 6;AT 19,e;"B"
 270 PRINT PAPER 6;AT 20,e;"C"
 280 IF ae=19 THEN RANDOMIZE USR
 32500: RANDOMIZE USR 32520: GO
TO 560
 290 LET g=g+10: IF g+h>=13 THEN
 LET m=INT (RND*20)+8: LET n=1
 300 IF n=0 THEN GO TO 390
 310 IF SCREEN$ (ab,m)="" THEN G
O TO 330
 320 GO TO 390
 330 FOR c=ae+1 TO 18 STEP 1: PR
INT INK 2; PAPER 6;AT c,m;CHR$ 1
53: RANDOMIZE USR 32663: PRINT P
APER 6;AT c,m;CHR$ 128: NEXT c
 340 GO SUB 80
 350 LET n=0: LET g=0
 360 IF m=e THEN RANDOMIZE USR 3
2513: LET l=l-1: PRINT AT 21,17+
l;" ": GO SUB 100
 370 IF a+9=e THEN RANDOMIZE USR
 32513: LET l=l-1: PRINT AT 21,1
7+l;" ": GO SUB 100
 380 IF l=0 THEN GO TO 560
 390 GO SUB 110
 400 IF x=0 THEN GO TO 470
 410 LET k=e-a+1
 420 IF SCREEN$ (ae,e)="" AND x=
1 THEN GO SUB 620: LET d$(k TO k
)=" ": LET sc=sc+10: LET nm=1: G
O TO 460
 430 IF SCREEN$ (ad,e)="" AND x=
1 THEN GO SUB 630: LET c$(k TO k
)=" ": LET sc=sc+20: LET nm=1: G
O TO 460
 440 IF SCREEN$ (ac,e)="" AND x=
1 THEN GO SUB 640: LET b$(k TO k
)=" ": LET sc=sc+50: LET nm=1: G
O TO 460
 450 IF SCREEN$ (ab,e)="" AND x=
1 THEN GO SUB 650: LET a$(k TO k
)=" ": LET sc=sc+100: LET nm=1:
GO TO 460
 460 LET x=0: IF nm=1 THEN LET t
=t+10: LET nm=0
 470 PRINT PAPER 5;AT 2,0;e$;" "
 480 PRINT PAPER 6;AT ab,a;e$;AT
 ac,a;e$;AT ad,a;e$;AT ae,a;e$
 490 IF a=1 THEN LET q=0: IF vb>
=5-h THEN LET ab=ab+1: LET ac=ac
+1: LET ad=ad+1: LET ae=ae+1
 500 IF a=10 THEN LET q=1: IF vb
>=10-h THEN LET ab=ab+1: LET ac=
ac+1: LET ad=ad+1: LET ae=ae+1:
LET q=1
 510 IF a=1 OR a=5 THEN LET vb=v
b+1
 520 IF q=0 THEN LET a=a+1
 530 IF q=1 THEN LET a=a-1
 540 IF t=400 THEN LET t=0: GO T
O 560
 550 GO TO 180
 560 PRINT INVERSE 1; INK 2; BRI
GHT 1; FLASH 1;AT 10,0;"
```

(continued on next page)

(continued from previous page)

```
G A M E  O V E R  "
 570 RANDOMIZE USR 32520
 580 RANDOMIZE USR 32542: RANDOM
IZE USR 32569
 590 INPUT "Press ENTER for anot
her Go ";I$
 600 IF I$="" THEN RESTORE 660:
GO TO 20
 610 STOP
 620 FOR y=88 TO 80 STEP -1: POK
E 23675,y: PRINT INK 3; PAPER 6;
AT se,4;CHR$ 148: RANDOMIZE USR
32663: NEXT y: POKE 23675,88: RE
TURN
 630 FOR y=88 TO 80 STEP -1: POK
E 23675,y: PRINT INK 3; PAPER 6;
AT ad,4;CHR$ 148: RANDOMIZE USR
32663: NEXT y: POKE 23675,88: RE
TURN
 640 FOR y=88 TO 80 STEP -1: POK
E 23675,y: PRINT INK 3; PAPER 6;
AT ac,4;CHR$ 148: RANDOMIZE USR
32663: NEXT y: POKE 23675,88: RE
TURN
 650 FOR y=88 TO 80 STEP -1: POK
E 23675,y: PRINT INK 3; PAPER 6;
AT ab,4;CHR$ 148: RANDOMIZE USR
32663: NEXT y: POKE 23675,88: RE
TURN
 660 RANDOMIZE USR 32569: PRINT
AT 2,4;"B A T T L E G R O U N D"
;AT 4,6;"© Brian Fitton 1985"
 670 PLOT 30,130: DRAW 188,0: DR
AW 0,34: DRAW -188,0: DRAW 0,-34
 680 PLOT 30,100: DRAW 188,0: DR
AW 0,-70: DRAW -188,0: DRAW 0,70
 690 PRINT AT 10,4;"Keys are:-"
AT 12,7;"Z moves gun Left";AT 14
,7;"X moves gun Right";AT 16,7;"
SPACE BAR to Fire"
 700 PLOT 30,10: DRAW 188,0: DR
AW 0,14: DRAW -188,0: DRAW 0,-14
 710 PLOT 30,10: DRAW 188,0: DRA
W 0,14: DRAW -188,0: DRAW 0,-14
 720 FOR a=0 TO 7: READ b: POKE
USR "a"+a,b: NEXT a
 730 FOR a=0 TO 7: READ b: POKE
USR "b"+a,b: NEXT a
 740 FOR a=0 TO 7: READ b: POKE
USR "c"+a,b: NEXT a
 750 FOR a=0 TO 7: READ b: POKE
USR "d"+a,b: NEXT a
 760 FOR a=0 TO 7: READ b: POKE
USR "e"+a,b: NEXT a
 770 FOR a=0 TO 7: READ b: POKE
USR "f"+a,b: NEXT a
 780 FOR a=0 TO 7: READ b: POKE
USR "g"+a,b: NEXT a
 790 FOR a=0 TO 7: READ b: POKE
USR "h"+a,b: NEXT a
 800 FOR a=0 TO 7: READ b: POKE
USR "i"+a,b: NEXT a
 810 FOR a=0 TO 7: READ b: POKE
USR "j"+a,b: NEXT a
 820 FOR a=0 TO 7: READ b: POKE
USR "k"+a,b: NEXT a
 830 FOR a=0 TO 7: READ b: POKE
USR "l"+a,b: NEXT a
 840 DATA 57,122,20,124,124,168,
40,108
 850 DATA 56,40,40,40,40,40,68,6
8,68,68,68,68,130,130,130,255
 860 DATA 0,0,0,0,0,0,0,0,57,58,
20,124,124,168,40,108
 870 DATA 63,31,15,0,0,0,0,0,255
,255,255,0,0,0,0,0,252,248,240,0
,0,0,0,0,0,0,0,0,112,34,34,255
 880 DATA 0,0,0,56,56,56,16,16
 890 DATA 0,0,24,44,60,24,0,0
 900 DATA 2,60,78,94,126,126,60,
0
 910 INPUT TAB 4;"SELECT LEVEL (
1 TO 5) ";h
 920 IF h<1 OR h>5 THEN GO TO 91
0
 930 CLS : LET sc=0
 940 LET a$="A A A A A A F A A A
"
 950 LET b$="A A A A A A F A A A
"
 960 LET c$="A A A A A A A A A A
"
 970 LET d$="A A A A A A A A A A
"
 980 LET f$=" I              I
I           FGH          FGH         F
GH "
 990 LET bc=0: IF sc>0 AND h<12
THEN LET h=h+10
1000 LET vb=0: LET ab=2: LET ac=
4: LET ad=6: LET ae=8: LET af=0
1010 LET o=0: LET y=0: LET x=0:
LET m=31: LET g=0
1020 LET i=0: LET n=0: LET q=0
1030 LET e$=""
1040 LET nm=0: LET l=3: LET s=15
1050 RANDOMIZE USR 32542: RETURN

1060 FOR y=80 TO 88 STEP 1: POKE
 23675,y: PRINT INK INT (RND*4);
 PAPER 6;AT ab,3;a$;AT ac,3;b$;A
T ad,3;c$;AT ae,3;d$: RANDOMIZE
USR 32663: NEXT y: POKE 23675,88
: RETURN
```

The hex loader.

Listing 2.

```
 10 DEF FN h(h$)=16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2
)-48-(7 AND h$(2)>"9")
 20 INPUT "Start ";s
 30 INPUT "Finish ";f
 40 FOR n=s TO f STEP 8
 50 LET tot=0: PRINT n;": ";
 60 INPUT h$: PRINT h$;
 70 LET x=0
 80 FOR b=1 TO LEN h$ STEP 2
 90 LET z=FN h(h$): LET tot=tot
+z
 100 POKE n+x,z
 110 LET h$=h$(3 TO ): LET x=x+1
 120 NEXT b
 130 PRINT " = ";: INPUT t: PRIN
T t
 140 IF tot<>t THEN PRINT "input
 error - try again": GO TO 50
 150 NEXT n
 160 REM enter STOP to stop
```

The machine code.

```
32499: 3E3E0821FF571100 = 521
32507: 5801000377ED803C = 684
32515: FE7F20EFC906280E = 913
32523: FFC30003FE10FE14 = 1116
32531: 20F6CD7920F30573 = 815
32539: 20EDC90100032164 = 607
32547: 01110120E5D5C5CD = 963
32555: D3C0C1D1E1E2308 = 802
32563: 78FE0020EFC9015E = 941
32571: 0121900111030DE5 = 428
32579: C5CDB523C1E12308 = 1250
32587: 78FE0020EF0015E01 = 741
32595: 110300D5E5CDB503 = 835
32603: E1C10B2E78FE0020 = 878
32611: EFC91101000010000 = 459
32619: 25000A5FE5D5C5CD = 1303
32627: B503C1D1E10378FE = 1188
32635: 0720EFC9C1F40121 = 758
32643: 2C01110100E5C5CD = 694
32651: B503C1E1230B78FE = 1022
32659: 0020EFC9C17F0021 = 633
32667: 8A0011010CD5C5E5 = 827
32675: CDB503E1C1010323 = 1054
32683: 2323011AFE0120EE = 616
32691: C900000000000000 = 201
```

Boxing

Jason Freer,
Ramsgate,
Kent.

CBM-64

THE PROGRAM offers you a bird's eye view of a boxing ring and the opportunity to go through three rounds with an opponent of your choice is possible if your strategy's slick enough. The keys for the game are X is for down and Z is for up. The > key is for moving right and the < key is for moving left.

The CBM key is for punching with the left hand and the Shift key is for punching with the right hand. Please note that this game is for the Commodore 64 computer and has sound and 10 levels of play. This program has instructions with it.

```
0 POKE53281,7:POKE53280,21
1 PRINT"{CLR}":PRINT"{DOWN}"TAB(15)"{RVS}WELC
OME TO"
2 PRINT"{DOWN}{DOWN}{DOWN}"TAB(6)"{GRAPHICS}"
3 PRINT"{DOWN}{DOWN}"TAB(14)"{GRAPHICS} X I N
G"
4 PRINT"{DOWN}{DOWN}"TAB(15)"{RVS}BY"
5 PRINT"{DOWN}{DOWN}"TAB(16)"{GRAPHICS}
R"
17 FORI=1TO3000:NEXTI
18 REM** BOXING CHAMPION ***
19 REM** BY JASON F **
20 REM** FOR THE CBM 64 **
21 POKE53280,12:POKE53281,8
22 S1=0:S2=S1:V=53248:POKEV,0:PO
KEV+1,0:POKEV+2,0:POKEV+3,0
23 GOSUB7000:POKE53280,2:POKE53
281,2
24 GOSUB2500
25 ROUND=1:PRINTCHR$(8):POKEV+2
1,3
30 GOSUB8500
62 PRINT"{HOME}{DOWN}{DOWN}{DOWN}"TAB(33)RO
63 POKESO+15,37:POKESO+4,21
70 X=32:Y=60:TM=3:TS=1:F=204:G=2
20:E=0:POKE2040,135:POKE2041,192
:POKESO+4,20
100 POKEV,X:POKEV+1,Y:POKEV+2,F:
POKEV+3,G
130 TS=TS-1:IFTS=0THENTM=TM-1:TS
=60:IFTM=-1THENGOTO8500
150 PRINT"{HOME}{DOWN}{DOWN}":PRINTTAB(30)T
M;":";:IFTS<10THENPRINT"0";
160 PRINTTS
400 IFPEEK(653)=2THENGOSUB 1000
410 IFPEEK(653)=1THENGOSUB 1100
450 IFF<X+20THENIFRND(1)>SKTHENG
OSUB2000
500 KE=PEEK(197)
505 Y=Y-8*((KE=23AND(Y<220)-(KE=1
2AND(Y>60))
510 X=X-8*((KE=44AND(X<224)-(KE=4
7AND(X>32))
550 F=F+8*INT(RND(1)*2.5)*-((F<X
+4)-(F>X+4))*(F>32)*(F<232)
552 IFF<X+6THENF=X+6
560 G=G+8*INT(RND(1)*2.5)*-((G<Y
)-(G>Y))
563 IFG=YTHENG=Y+8*(INT(RND(1)*3
)-1)
565 IFG>220THENG=220
570 IFE=0THENIFF>210THENE=1
580 IFE>0THENE=E+(X<100)+1:IFE=1
0THENGOSUB3000
690 REM SOUND
700 GOTO100
1000 POKE2040,197:POKESO+8,10
1020 IFY<G+12ANDY>G+4THENIFX>F-1
2ANDX<F+4THENS1=S1+1:GOSUB1200:P
OKESO+11,33
1030 IFS1=K2THENGOTO6000
1040 FORT=1TO40:NEXT
1050 POKE2040,135:POKESO+11,0
1090 RETURN
1100 POKE2040,196:POKESO+8,10
1120 IFY<G-4ANDY>G-12ANDX>F-12AN
DX<F+4THENS1=S1+1:GOSUB1200:POKE
SO+11,33
1130 IFS1=K2THENGOTO6000
1140 FORT=1TO40:NEXT
1150 POKE2040,135:POKESO+11,0
1190 RETURN
1200 PRINT"{HOME}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}"TAB
(32)S1
1210 RETURN
2000 IFG>YTHENGOTO2100
2010 POKE2041,194:POKESO+8,12
2020 IFG>Y-12ANDG<Y-4THENIFF>XAN
DF<X+8THENS2=S2+1:GOSUB2200:POKE
SO+11,33
2035 IFS2=K1THENGOTO6500
2040 FORT=1TO40:NEXT
2050 POKE2041,192:POKESO+11,0
2090 RETURN
2100 POKE2041,193:POKESO+8,12
2130 IFG>Y+4ANDG<Y+12THENIFF>XAN
DF<X+8THENS2=S2+1:GOSUB2200:POKE
SO+11,33
2135 IFS2=K1THENGOTO6500
2140 FORT=1TO40:NEXT
2150 POKE2041,192:POKESO+11,0
2190 RETURN
2200 PRINT"{HOME}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}
{DOWN}"TAB(32)S2
2210 RETURN
2500 REM * SOUNDS *
2505 SO=54272:FORT=0TO28:POKESO+
T,0:NEXTT
2510 POKESO+1,145:POKESO+5,7:POK
ESO+6,123:POKESO+15,19:POKESO+24
,15
2520 POKESO+9,10:POKESO+12,9:POK
ESO+13,123
2550 RETURN
3000 REM*** UP AGAINST THE ROPES
***
3010 FORT=200TO150STEP-1:POKEV,T
:NEXTT
3040 E=0:X=T:RETURN
6000 X=X-10:F=F+10:POKEV+2,F:POK
E2041,198:POKEV,X:POKESO+11,0
6010 POKESO+15,19:FORT=1TO10:POK
ESO+4,21:FORDL=1TO100:NEXTDL:POK
ESO+4,20
6020 FORDL=1TO100:NEXTDL:NEXTT
6050 PRINT"{HOME}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}"TAB(10)"WE
LL BOXED - A K.O."
6060 POKE2040,199:FORDL=1TO5000:
NEXT
6100 GOTO6625
6500 X=X-10:F=F+10:POKEV,X:POKE2
040,198:POKEV+2,F:POKESO+11,0
6510 POKESO+15,19:FORT=1TO10:POK
ESO+4,21:FORDL=1TO100:NEXTDL:POK
ESO+4,20
6520 FORDL=1TO100:NEXTDL:NEXTT
6550 PRINT"{HOME}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}  BAD LUCK
 A K.O.!!"
6600 POKE2041,199:FORDL=1TO5000:
NEXT
6625 POKEV+21,0:PRINT"{CLR}":IFK1=S
2ORS2>S1THEN6700
6630 PRINT" WELL DONE!! ":PRINT"
YOU BEAT "B$(XX)" IN "RO" ROUNDS
"
6640 PRINT"{DOWN}THE RESULT IN POINTS
 WAS "S1" FOR YOU":PRINT"AND "S2
" FOR "B$(XX)
6650 PRINT"{DOWN} I SUGGEST THAT YOU
TRY A TOUGHER         OPPONENT"
6660 GOTO6780
6700 PRINT"{DOWN}BAD LUCK!!":PRINT"
{DOWN}YOU WERE BEATEN IN "RO" ROUNDS"

6710 PRINT"{DOWN}THE RESULT IN POINTS
 WAS "S1" FOR YOU":PRINT"AND "S2
" FOR "B$(XX)
6720 PRINT"{DOWN}I SUGGEST THAT YOU T
RY A WEAKER OPPONENT"
6780 PRINT"{DOWN} HERE'S YOUR CHOICE
:-"
6790 FORF=1TO10:PRINTF"...";:IFF
<>10THENPRINT".",
6795 PRINTB$(F):NEXTF:POKE198,0
6797 INPUT"ENTER YOUR OPPONENTS
NO. OR 0 TO END";XX:IFXX<>0THEN6
810
6800 PRINT"{CLR}{DOWN}{DOWN}{DOWN} NEXT TIME YOU W
ANT A FIGHT I WILL BE "
6805 PRINT"{DOWN}{DOWN}{DOWN}{DOWN}{DOWN} FOR YOU{DOWN}{DOWN}{DOWN}{DOWN}":
END
6810 PRINT"{CLR}{DOWN}{DOWN}{DOWN}OK- YOU SHALL FIG
HT " B$(XX):PRINT"{DOWN}PRESS A KEY T
O START"
6820 GETW$:IFW$=""THEN6820
6830 S1=0:S2=0:SK=(11-XX)/12:K2=
10+XX+INT(RND(1)*5):K1=16-XX+INT
(RND(1)*10)
6840 GOTO25
7000 RESTORE:REM TITLES ECT.
7100 PRINT"{CLR}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}    ENTER YOU
R NAME (MAX 6 LETTERS)"
7150 INPUTC$:IFLEN(C$)>6THEN7100

7200 PRINT"{CLR}";
7500 DATA"HENRY HOPELESS","ARNOL
D AWFUL","NIGEL NO-GOOD","PHILIP
 FAIR"
7502 DATA"ANDREW AVERAGE","ROGER
 RIGHT-HOOK","BRIAN BRICKWALL","
SIMON SUPER"
7504 DATA"EDWARD EXCELLENT","FLY
NN FANTASTIC"
```

```
7510 PRINT"        ▪CC R3 AC MC
PB CS CC MC S3 HB IL P"
7515 PRINT"              B O X
I N G "
7520 PRINT"  SO YOU WANT TO BE
 A CHAMPION DO YOU?"
7522 PRINT"  IF SO THEN THIS IS
 THE GAME FOR YOU"
7524 PRINT"  WHICH OPPONENT DO
YOU WISH TO FIGHT
      FIRST?"
7530 FORF=1TO10:READA$:PRINTF"..
.";:IFF<>10THENPRINT".";
7535 PRINTA$:B$(F)=A$:NEXTF
7540 INPUTXX:IFXX<1ORXX>10THENPR
INT"  ":GOTO7540
7545 SE=(11-XX)/12
7546 K2=16+XX+INT(RND(1)*6):K1=1
6-XX+INT(RND(1)*10)
7550 B$=LEFT$(B$(XX),6)
7560 PRINT"":PRINT"      VERY W
ELL,YOUR OPPONENT WILL BE":PRIN
TTAB(14)B$(XX)
7562 PRINT" EACH BOUT YOU FIGH
T IS ONLY 3 ROUNDS"
7564 PRINT" MOVE ABOUT THE RING
 WITH X Z AND <>";
7566 PRINT"     CBM (LEFT HAND
) SHIFT (RIGHT HAND)"
7568 PRINT"NOTE THAT YOU CAN MO
VE AND PUNCH AT THE":PRINT" SAM
E TIME."
7570 PRINT"ONLY PUNCHES TO THE
HEAD SCORE.":PRINT"KNOCK-OUTS
ARE POSSIBLE"
7575 GOSUB9000
7580 PRINT"PRESS ANY KEY TO ST
ART THE BOUT"
7590 GETX$:IFX$=""THEN7590
7595 RETURN
8500 REM * END OF ROUND *
8505 PRINT""TAB(29)" 0 : 0
0 "
8510 POKES0+4,21
8520 POKE2040,191:POKE2041,19?
8530 FORT=1TO500:NEXT:POKES0+4,2
0
8540 X=X+4*(X>32):Y=Y+4*(Y)60):F
=F-4*(F<224):G=G-4*(G<220)
8550 POKEV,X:POKEV+1,Y
8560 POKEV+2,F:POKEV+3,G
8565 POKE2040,192:POKE2041,195
8570 IFX<=32ANDY<=60ANDF>=224AND
G>=220THEN8580
8575 GOTO8540
8580 ROUND=ROUND+1:IFROUND=4THEN
ROUND=3:GOTO6620
8585 POKES0+15,19:FORT=1TO10:POK
ES0+4,21
8590 PRINT""TAB(7)"PRE
PARE TO FIGHT":PRINTTAB(7)" THE
NEXT ROUND "
8595 FORDL=1TO200:NEXTDL:POKES0+
4,20
8600 PRINT""TAB(7)"
           ":PRINTTAB(7)"
               "
8605 FORDL=1TO200:NEXTDL
8610 NEXTT
8620 GOTO62
9000 REM*READ IN SPRITE DATA HER
E*
9010 FORT=0TO511:READA:POKE192*6
4+T,A:NEXTT
9100 POKE2040,192:POKE2041,195:P
OKEV+39,0:POKEV+40,7
9400 RETURN
9500 REM * DRAW THE RING *
9510 AA$="%":BB$=AA$
9520 FORT=1TO27:AA$=AA$+"%":BB$=
BB$+" ":NEXTT
9530 PRINT""TAB(8)"POINTS"TAB(1
8)"POINTS"TAB(32)"TIME"
9535 AA$=AA$+"%":BB$=BB$+"%"
9540 PRINT""AA$:FORT=0TO22:PRIN
TBB$:NEXTT:PRINTAA$;
9600 PRINT""SPC(152)"TIME"SPC(1
95)"ROUND"SPC(195)"POINTS"SPC(35
)LEFT$(C$,6)
9605 PRINT""TAB(32)LEFT$(B$(
XX),6)
9650 RETURN
20010 REM *** SPRITE BOXER-LEFT
***
20012 DATA0,56,0,0,127,252,0,127
,254,0,187,2
20013 DATA0,127,2,0,56,63,0,0,12
7,0,0,127
20014 DATA0,0,33,0,0,63,0,0,0,0,
0,0
20015 DATA0,0,65,0,0,93,0,0,127,
0,56,127
20016 DATA0,127,63,0,127,2,0,127
,254,0,127,252
20017 DATA0,56,0,0
20020 REM***SPRITE LEFT-PUNCH R*
**
20021 DATA112,0,0,255,255,252,25
5,255,254,254,0,2
20023 DATA254,0,18,112,0,62,0,0,
127,0,0,99
20024 DATA0,0,65,0,0,65,0,0,1,0,
0,65
20025 DATA0,0,65,0,0,95,0,0,126,
0,56,62
20026 DATA0,127,18,0,127,2,0,127
,254,0,127,252
20027 DATA0,56,0,0
20030 REM**SPRITE LEFT-PUNCH LEF
T**
20032 DATA0,56,0,0,127,252,0,127
,254,0,127,2
20033 DATA0,127,18,0,56,62,0,0,1
27,0,0,99
20034 DATA0,0,65,0,0,65,0,0,1,0,
0,65
20035 DATA0,0,65,0,0,95,0,0,127,
112,0,62
20036 DATA254,0,18,254,0,2,255,2
55,254,255,255,252
20037 DATA112,0,0,0
20100 REM**SPRITE BOXER RIGHT **
*
20102 DATA0,56,0,63,252,0,127,25
2,0,65,252,0
20103 DATA73,252,0,124,56,0,126,
0,0,190,0,0
20104 DATA131,0,0,131,0,0,129,0,
0,131,0,0
20105 DATA171,0,0,198,0,0,254,0,
0,124,56,0
20106 DATA73,252,0,65,252,0,127,
252,0,63,252,0
20107 DATA0,56,0,0
20110 REM**SPRITE RIGHT-R PUNCH*
*
20112 DATA0,28,0,63,254,0,127,25
4,0,64,254,0
20113 DATA72,126,0,124,28,0,125,
0,0,198,0,0
20114 DATA131,0,0,131,0,0,129,0,
0,131,0,0
20115 DATA131,0,0,193,0,0,126,0,
0,124,0,14
20116 DATA72,0,63,64,0,127,123,2
55,255,63,255,255
20117 DATA0,0,14,0
20120 REM**SPRITE RIGHT-L PUNCH
**
20122 DATA0,0,14,63,255,255,127,
255,255,64,0,127
20123 DATA72,0,63,124,0,14,126,0
,0,198,0,0
20124 DATA131,0,0,131,0,0,129,0,
0,131,0,0
20125 DATA131,0,0,193,0,0,120,0,
0,124,28,0
20126 DATA72,126,0,64,254,0,127,
254,0,63,254,0
20127 DATA0,28,0,0
20130 REM*** SPRITE LOSER ***
20132 DATA0,0,0,0,0,24,0,0,24,0,
48,0
20133 DATA1,241,248,2,49,0,2,1,0
,2,1,0
20134 DATA115,253,0,251,255,0,25
5,254,0,255,254,0
20135 DATA251,255,0,115,252,123,
2,0,64,2,0,126
20136 DATA30,0,2,124,0,6,96,0,3,
0,0,0
20137 DATA0,0,0,0
20140 REM*** SPRITE WINNER ***
20142 DATA112,0,224,112,0,224,32
,240,64,33,240,64
20143 DATA35,188,64,35,188,64,35
,252,64,19,12,128
20144 DATA0,240,0,1,242,0,0,252,
0,3,252,0
20145 DATA0,252,0,1,248,0,0,240,
0,1,152,0
20146 DATA1,152,0,3,156,0,1,152,
0,13,155,0
20147 DATA15,159,0,0
```

Possessed

Guy Rowland,
Hextable,
Kent.

ZX-81

POSSESSED IS a game for the 16K ZX-81 written entirely in machine code. The game itself occupies under 1K, but uses the full display file which unfortunately means the Rampack has to be firmly placed on the back of the machine for the game to run. The idea of the game is loosely based on Robotron: you are a megabeing — or a 0 — running around shooting the robots — or Xs — and the highly technical idea behind it is to zap as many robots as possible before the last of your five lives deserts you. The game includes on screen scoring and a border indicating how many lives you have left.

The code is held in three Rem statements which should be the first three lines of the program. To begin, put the computer in fast mode, then type:

1 REM............439 FULL STOPS OR ANY OTHER CHARACTERS.............

and then slow. When entered, Peek 16953 should give 118 if you have done this correctly. It it gives another number, add or delete characters as necessary. Next enter the short hex loader program in figure 1. This is the same as any normal hex loader, with two important additions:

- totals are entered at the start of each line of hex, and
- the END address is entered, so the computer stops automatically

If an error is made in entering any line of hex, instead of displaying the total, it will print E, and you must enter the total and hex again. So now enter the hex numbers and total in figure 2.

When you have finished this, alter the loader program so line 10 reads:

LET A=16959

and line 20 reads

LET D=17301

Next, type in a Rem statement at line 2, 343 characters long — which should return a value of 118 when 173C2 is Peeked — and enter the hex in figure 3.

The final Rem statement is only 72 characters long, and should be line 3 of your program. Peek 17380 should give 118, and lines 10 and 20 of the loader should have the values 17308 and 17379. Enter the hex in figure 4, save the whole lot a couple of times just to make sure no mistakes have crept in, and type:

RAND USR 17303

Border will flash

After pressing Newline, a border will flash, several Xs and an 0 will appear, the screen will go dark for a second and the game will commence. If you are not touching any of the keys, you will start firing and moving up, and before long one of the robots will get you. To move your megabeing around, use the following control:

any key from Q to T for up
any key from Z to V for down
any key from A to G for left, and
any key from H to L for right

I find it easiest to use Q, Z, G and H, although you may prefer others. Since you fire automatically in the direction you are moving, there is no fire button, and diagonal movement is possible by pressing two keys at once.

When a whole screen of robots is cleared, a screen with more robots should appear. On average, each screen should have two or three more robots than the last, although occasionally you may find a higher sector has less than the one before.

If the game does not run correctly or crashes at some stage, reload the program from tape and enter the program in figure 4 substituting values for A and D depending on which Rem statement you are checking. When a screen is full of hex, press Cont to carry on where you left off. To alter the value of a byte, Poke the address with the correct value in decimal as a direct command. A hex/decimal conversion table is given in the Sinclair manual on page 181.

The game is available direct from the author for those who find the hex listing too hard. Please send £1.50 and a sae to Guy Rowland, Stonyacres, College Road, Hextable, Kent, BR8 7LT.

Figure 1.

```
  5 REM HEXLOADER
 10 PRINT "START ADDRESS"
 20 INPUT S
 30 PRINT "FINISH ADDRESS"
 40 INPUT F
 50 FOR N=S TO F STEP 8
 60 LET T=0
 70 PRINT N;": ";
 80 INPUT A$
 90 PRINT A$;" = ";
100 INPUT TOT
110 PRINT TOT
115 IF PEEK 16422=2 THEN SCROLL

120 LET Z=0
130 FOR K=1 TO LEN A$ STEP 2
140 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
150 LET T=T+C
160 POKE N+Z,C
170 LET Z=Z+1
180 NEXT K
190 IF TOT=T THEN GOTO 220
200 PRINT "ERROR - PLEASE INPUT
AGAIN"
205 IF PEEK 16442=2 THEN SCROLL

210 GOTO 60
220 NEXT N
```

(continued from previous page)

Figure 2.

```
16514: 2A0C40CD35400616 = 564
16522: 111F002323771977 = 381
16530: 10F92306202377 10 = 505
16538: FCC906143E80C5CD = 1071
16546: 8240C13CFE8A20F6 = 1117
16554: 10F23AA951CD8240 = 951
16562: 3D32A9619E5D52A = 1062
16570: 32405350292919 29 = 438
16578: 2919ED5B34401922 = 569
16586: 324070D1E1C92A0C = 908
16594: 4011230019 3AA861 = 464
16602: 4F161606 1E3600CD = 418
16610: B740913022363D23 = 598
16618: 10F3232032315 20CD = 658
16626: C906182A0C40237E = 510
16634: FE762805C6807718 = 888
16642: F510F3C92A0C4011 = 840
16650: 9C0011936534CDF340 = 802
16658: 0EFF067D10FE0D20 = 718
16666: F9CDF34039CDBB02 = 1356
16674: 70FEFF2832332AC61 = 998
16682: 3AAC614F3AAA6157 = 818
16690: 3AAB615F3600CB51 = 711
16698: 200A7BFE3128051D = 494
16706: 78D621473B492007 = 753
16714: 7AFE022832 1505CB = 648
16722: 41200A75FE162805 = 551
16730: 1C78C62147CB7120 = 798
16738: 077AFE1FE0021404 = 402
16746: 7A32AA617B32AB61 = 880
16754: 7832AD61C92A0C40 = 758
16762: 3AAA6147E310FD3A = 758
16770: A5614711210019 10 = 432
16778: FDC90E15CD77413A = 942
16786: AD615F1600FEC838 = 897

16794: 0216FF19066410FE = 660
16802: 7EFE3D2813FEBD28 = 983
16810: 10FE0200037118EB = 831
16818: 79FE18C00E0018D4 = 844
16826: 36BD0E00CDE34118 = 778
16834: CB3600C9CD774136 = 901
16842: 00CD1F41CD77417E = 816
16850: FE3DCA7641363 43A = 864
16858: AD61FE00C8CD8C41 = 1134
16866: C92A0C4011140019 = 381
16874: 7EFEA52802 34C936 = 894
16882: 9C2B18F4CD77410E = 870
16890: 0A3634E5CDF340E1 = 1082
16898: 36BDE5CDF340E13D = 1222
16906: 20EF3500ED7B7B10 = 872
16914: C93AAE61FE042031 = 821
16922: AF3C32AE61FE023A = 1030
16930: 3F42035042FE003A = 940
16938: C742C3E442B7AA94 = 1255
16946: 9C9C9C9C9C
```

Figure 3.

```
16959: 2152422286422A0C = 469
16967: 4011F502193AAA61 = 678
16975: 3D1826 5F78BAD036 = 791
16983: 00E523183 6216E42 = 551
16991: 2286422A0C4011F5 = 614
16999: 02193AAE6118 0F5F = 487
17007: 79BAD03600E5D511 = 1028
17015: 210019D11315570E = 413
17023: 18061E7EFE3DCC6E = 813
17031: 422D10F72D8E2D0D = 514
17039: 20EFC97EFE3D2810 = 969
17047: FE34CAF6413F3440 = 993
17055: CB4728043 63DE1C9 = 859
17063: E11363DC95 7020006 = 848
17071: 007EFE3DCCFE4223 = 952
17079: 0478FE1E20F32323 = 753
17087: 230C79FE1520E8C9 = 909
17095: 210A42228 1422F0C = 651
17103: 40112300123AAF61 = 466
17111: 3D18D15F73BAD836 = 965
17119: 00E52B18AE21F842 = 815
17127: 22B4422A0C401123 = 450
17135: 00193AAE6118B55F = 651
17143: 79BAD83600E5D511 = 1036
17151: 2100ED52D1188C2A = 767
17159: 0C401178011906 08 = 253
17167: 0E011606D5112100 = 311
17175: C5772310FD77190D = 776
17183: 20FBC1040DC5772B = 851
17191: 10FC77ED520D20FA = 1001
17199: C1040C16FF1520FD = 792
17207: D11520D8C9ED737B = 1154
17215: 40CD9C402A0C4011 = 624
17223: 0A0019545D210040 = 440
17231: 010D00EDB0CDD040 = 904
17239: CD0641CDC541CD13 = 968
17247: 427BFE3D28F52188 = 958
17255: 43545D2A0C40010A = 373
17263: 0009010D00EDB03E = 498
17271: 88CD0643 3E80CD06 = 815
17279: 43AFCD0643C90643 = 794
17287: C98888A8847B7AA94 = 1370
17295: 9C9CA1A49C8818
```

Figure 4.

```
17308: 215F43060435 9C23 = 498
17316: 10FB21F851350223 = 656
17324: 00A1CDD040CD3C40 = 1035
17332: FE762815180DCDD8 = 891
17340: 43CD6543CD5443FE = 1050
17348: 7628062 1A8613418 = 538
17356: ED3AA9B61FE91C8CD = 1376
17364: 654318D621AA613E = 760
17372: 1023360C2335FEC9 = 658
```

Amsnake

P R King,
Ipswich,
Suffolk.

Amstrad

NOTHING UNUSUAL about this — just another snake game. Except for the fact that this game is fast, is entirely in Basic, becomes increasingly more difficult and the snake looks something like a snake. Seriously though folks, it should appeal to all levels of dexterity as it does start off fairly easy and becomes gradually more difficult.

The object of the game is to guide your snake around the screen, eating rats and avoiding mushrooms, the walls and of course — the snake. Your score increases with the length of the snake and so far my record is: 21,420 points, so type it in and have fun.

```
10 '**********************************
20 '*****                        *****
30 '*****        Amsnake         *****
40 '*****                        *****
50 '*****        P. King         *****
60 '*****                  1985  *****
70 '*****                        *****
80 '**********************************
90 GOSUB 150:'def chars & set up
100 GOSUB 390:'title & start
110 GOSUB 530:'screen
120 GOSUB 730:'play game
130 GOSUB 960:'end game
140 GOTO 110
150 '******* def chars & setup *******
160 mm=HIMEM:MEMORY 30000
170 DEF FN point(a.b)=TEST((a*16)-6.(406-b*16))
180 INK 3.6:INK 0.23:INK 1.9:INK 2.0
190 SYMBOL 240.&24,&18.&3C.&3C.&7E.&DB.&DB.&7E
200 SYMBOL 241.&7E.&DB.&DB.&7E.&3C.&3C.&18,&24
210 SYMBOL 242.&6.&F.&B9.&7F.&7F,&B9.&F,&6
220 SYMBOL 243.&60.&F0.&9D.&FE,&FE.&9D.&F0.&60
230 SYMBOL 244.&24.&5A.&BD.&66.&E7.&99.&5A.&3C
240 SYMBOL 245.&3C.&5A.&99.&E7.&66.&BD.&5A.&24
250 SYMBOL 246.&2C.&5A.&B9.&67.&67.&B9.&5A.&2C
260 SYMBOL 247.&34.&5A.&9D.&E6.&E6.&9D.&5A.&34
270 SYMBOL 248.&3C.&66.&5A.&66.&24.&3C.&18.&18
280 SYMBOL 249,&18.&18.&3C.&24.&66.&5A.&66.&3C
290 SYMBOL 250.&0.&70.&DC.&A7.&A7.&DC.&70.&0
300 SYMBOL 251,&0,&E,&38.&D5,&D5.&38,&E.&0
310 SYMBOL 252.0.0.4.&2E.&5F.&FF.2.&1C
320 SYMBOL 253.0.&3C.&42.&81.&BD.&5A.&18.&3C
330 SYMBOL 254,&24.&3C,&FF.&66,&66.&FF.&3C.&24
340 SYMBOL 255,&E7.&A5.&FF,&24.&24,&FF.&A5.&E7
350 ENV 1,1.15.1.15,-1,3
360 ENT 1,10,-5,1.10,5.1
370 ENV 2.5.3,2.15.-1.15
380 RETURN
390 '******* title & start ***********
400 CLS:BORDER 23
410 PEN 1:LOCATE 6.2:PRINT"*******    AMSNAKE    *****
**
420 PEN 3:LOCATE 6.6:PRINT"The object of the game is t
o guide"
430 PRINT:PRINT"your snake around the screen  using the"
440 PRINT:PRINT"keys shown below. eating the black rats"
450 PRINT:PRINT"but avoiding the mushrooms.    For eac
h"
460 PRINT:PRINT"rat you eat your snake will grow longe
r"
470 PRINT:PRINT"and the longer the snake is the greate
r"
480 PRINT:PRINT"your score will be."
490 PRINT:PRINT:PRINT"A = UP  Z = DOWN    / = LEFT  \
= RIGHT"
500 PEN 1:LOCATE 8.24:PRINT"PRESS ANY KEY TO CONTINUE"
510 Z$=INKEY$:IF Z$="" GOTO 510
520 RETURN
530 '*********** draw screen **********
540 MODE 1:PAPER 0:BORDER 23:CLS:PEN 3
550 FOR z=1 TO 40:LOCATE z.1:PRINT CHR$(255):LOCATE z.
23:PRINT CHR$(255):NEXT z
560 FOR z=2 TO 22:LOCATE 1.z:PRINT CHR$(255):LOCATE 40
.z:PRINT CHR$(255):NEXT z
570 PEN 1:LOCATE 8.13:PRINT CHR$(251):CHR$(247):CHR$(2
43)
580 ea=30001:eb=30002:ec=30003:fa=30007:fb=30008:fc=30
009
590 POKE ea.8:POKE eb.13:POKE ec.4:POKE 30004.9:POKE 3
0005.13:POKE 30006.4:POKE fa.10:POKE fb.13:POKE fc.4
600 FOR z=1 TO 3
610 c=INT(RND*38)+2
620 d=INT(RND*21)+2
630 IF FN point(c.d)<>0 GOTO 610
640 PEN 1:LOCATE c.d:PRINT CHR$(253)
650 c=INT(RND*38)+2
660 d=INT(RND*21)+2
670 IF FN point(c.d)<>0 GOTO 650
680 PEN 2:LOCATE c.d:PRINT CHR$(252)
690 NEXT z
700 LOCATE 3.25:PEN 2:PRINT"score: ":STR$(sc):LOCATE 2
4,25:PRINT"hi score: ":STR$(hi)
710 length=3
720 RETURN
730 '*********** play game ***********
740 PEN 1:sc=0
750 z$=INKEY$
760 IF z$="a" OR z$="A" THEN dir=1
770 IF z$="z" OR z$="Z" THEN dir=2
780 IF z$="/" OR z$="?" THEN dir=3
790 IF z$="\" OR z$="`" THEN dir=4
800 a=PEEK(fa):b=PEEK(fb)
```

```
810 IF dir=0 THEN dir=4
820 IF dir=1 THEN b=b-1
830 IF dir=2 THEN b=b+1
840 IF dir=3 THEN a=a-1
850 IF dir=4 THEN a=a+1
860 p=FN point(a.b):IF p=0 OR p=2 GOTO 880
870 IF p=1 OR p=3 THEN RETURN
880 LOCATE a.b:PRINT CHR$(239+dir):LOCATE PEEK(ea),PEE
K(eb):PRINT" "
890 LOCATE PEEK(fa),PEEK(fb):PRINT CHR$(243+PEEK(fc))
900 LOCATE PEEK(ea+3),PEEK(eb+3):PRINT CHR$(247+PEEK(e
c+3))
910 fa=fa+3:fb=fb+3:fc=fc+3:IF p=2 GOTO 920 ELSE ea=ea
+3:eb=eb+3:ec=ec+3
920 POKE fa,a:POKE fb,b:POKE fc,dir
930 IF p=2 THEN GOSUB 1050
940 GOTO 750
950 RETURN
960 '*********** end game ***********
970 SOUND 4,0,0,0,2,0,15
980 FOR Z=0 TO 26:INK 0.Z:BORDER Z:FOR Y=1 TO 50:NEXT
Y,Z
990 INK 0.23:BORDER 23
1000 DIR=0:SC=0:LENGTH=3
1010 Z$=""
1020 LOCATE 5.12:PEN 2:PRINT"PRESS SPACE BAR FOR ANOTH
ER GAME"
1030 z$=INKEY$:IF z$<>" " GOTO 1020
1040 RETURN
1050 '************* score *************
1060 SOUND 4.60,0.0.1.1
1070 c=INT(RND*38)+2
1080 d=INT(RND*21)+2
1090 IF FN point(c.d)<>0 GOTO 1070
1100 LOCATE c.d:PEN 1:PRINT CHR$(253)
1110 c=INT(RND*38)+2
1120 d=INT(RND*21)+2
1130 IF FN point(c.d)<>0 GOTO 1110
1140 LOCATE c.d:PEN 2:PRINT CHR$(252)
1150 sc=sc+length*10:length=length+1
1160 IF sc>hi THEN hi=sc
1170 sc$=STR$(sc):LOCATE 9.25:PEN 2:PRINT sc$
1180 hi$=STR$(hi):LOCATE 34.25:PRINT hi$
1190 PEN 1:SOUND 132.0:RETURN
```

Disc utility

Matthew Desmond,
Chelmsford,
Essex.

CBM-64

THIS IS A program for a Commodore 64 plus 1541 Disc drive. The program enables the user to enter disc commands without the need for the open statement. The facilities are:

Directory, Format, Scratch, Re-name, Initialise, Validate and Copy. Disc Utility is menu drive, fully "mug trapped" and disk status is shown after every operation.

Line Description.

10-1140 Main Set Up
1150-1210 Wait for a Key Press
1220-1290 Read Error From Disck
1300-1510 Main Menu
1520-1560 End Program Routine
1570-1700 Directory Routine
1710-1850 Format Routine
1860-1980 Scratch Routine
1990-2160 Re-name Routine
2170-2290 Initialise Routine
2300-2420 Validate Routine
2430-2840 Copy Routine
2850-3010 Machine Code Disassembly

The machine code reads a character from the disc for the directory.

```
1000 REM*******************************
*******
1010 REM          DISK  UTILITY
1020 REM  BY MATTHEW DESMOND (C)
 1984
1030 REM*******************************
*******
1040 DIM NF$(10):NF=8
1050 FORA=1TO8:READ NF$(A):NEXT
A
1060 DATADIRECTORY,FORMAT,SCRATC
H
1070 DATARE-NAME,INITIALISE,VALI
DATE
1080 DATACOPY,END
1090 FORA=50000TO50020
1100 READB:POKEA,B:NEXTA
1110 DATA 162,3,32,198,255,32,20
7
1120 DATA 255,32,210,255,208,246
,169
1130 DATA 13,32,210,255,76,204,2
55
1140 GOTO 1300
1150 REM*******************************
*******
1160 REM**** WAIT FOR  A KEY PRE
SS ****
1170 REM*******************************
*******
1180 PRINTTAB(13)"** PRESS A KE
Y **"
1190 POKE198,0
1200 GETA$:IFA$=""THEN1200
1210 RETURN
1220 REM*******************************
*******
1230 REM**** READ ERROR  FROM DI
SK ****
1240 REM*******************************
*******
1250 OPEN15,8,15
1260 INPUT#15,A,B$,C,D
1270 CLOSE15
1280 PRINT" DISK STATUS  :";A;
B$;C;D
1290 RETURN
1300 REM*******************************
*******
1310 REM************** MENU. *****
*******
1320 REM*******************************
*******
1330 POKE53280,6:POKE53281,1
1340 PRINT"";
1350 PRINTTAB(14)"_____________"
1360 PRINTTAB(14)"DISK UTILITY"
1370 PRINT""
1380 PRINTTAB(16)"*********"
1390 PRINTTAB(16)"* MENU *"
1400 PRINTTAB(16)"*********"
1410 PRINT
1420 FORA=1TONF
1430 PRINT,"",A,"> ";"";NF$(
A)
1440 NEXTA
1450 PRINT"WHICH FUNCTION DO
YOU REQUIRE? ";
1460 GOSUB1150:A=VAL(A$)
1470 IFA<1ORA>NFTHENGOTO1460
1480 PRINT"";A$;""
1490 ONA  GOTO1570,1710,1860,199
0,2170
1500 ONA-5GOTO2300,2430,1520
1510 GOTO1460
1520 REM*******************************
*******
1530 REM*************** END ******
*******
1540 REM*******************************
*******
1550 PRINT"GOODBYE."
1560 END
1570 REM*******************************
*******
1580 REM*********** DIRECTORY ***
*******
1590 REM*******************************
*******
1600 PRINT"";:PR=0
1610 PRINT"____________"
1620 PRINT"DIRECTORY:"
1630 PRINT"PLEASE LOAD DISK":GO
SUB1150
1640 OPEN3,8,0,"$0":GET#3,A$,A$
1650 GET#3,A$,A$,BL$,BH$
1660 IFA$=""THENCLOSE3:GOTO1700
1670 BL$=BL$+CHR$(0):BH$=BH$+CHR
$(0)
1680 PRINT256*ASC(BH$)+ASC(BL$),
1690 SYS50000:GOTO1650
1700 GOSUB1150:GOTO1300
1710 REM*******************************
*******
1720 REM************** FORMAT ****
*******
1730 REM*******************************
*******
1740 PRINT"";:ID$="":DN$=""
1750 PRINT"__________"
1760 PRINT"FORMAT:"
1770 PRINT"PLEASE LOAD DISK":GO
SUB1150
1780 INPUT"DISK NAME";DN$
1790 IFDN$=""ORDN$="*"ORDN$="$"T
HEN1710
1800 INPUT"DISK ID";ID$
1810 IFID$<>""THENDN$=DN$+","+ID
$
1820 OPEN1,8,15,"N0:"+DN$:CLOSE1
1830 GOSUB1220
1840 GOSUB1150
1850 GOTO 1300
1860 REM*******************************
*******
1870 REM************* SCRATCH ****
*******
1880 REM*******************************
*******
1890 PRINT"";
1900 PRINT"__________"
1910 PRINT"SCRATCH:"
1920 PRINT"PLEASE LOAD DISK":GO
SUB1150
1930 PRINT"NAME OF PROGRAM TO BE
 SCRATCHED"
1940 INPUTPN$:IFPN$=""THEN1960
1950 OPEN2,8,15,"S0:"+PN$:CLOSE2

1960 GOSUB1220
1970 GOSUB1150
1980 GOTO1300
1990 REM*******************************
*******
2000 REM*********** RE-NAME *****
*******
2010 REM*******************************
*******
2020 PRINT"";
2030 PRINT"__________"
2040 PRINT"RE-NAME:"
2050 PRINT"PLEASE LOAD DISK":GO
SUB1150
2060 PRINT"NEW NAME";
```

(continued on next page)

(continued from previous page)

```
2070 INPUTNN$
2080 IFNN$=""ORNN$="$"ORNN$="*"T
HEN1990
2090 PRINT"OLD NAME";
2100 INPUTOL$
2110 IFOL$=""OROL$="$"OROL$="*"T
HEN1990
2120 OPEN4,8,15,"R0:"+NN$+"="+OL
$
2130 CLOSE4
2140 GOSUB1220
2150 GOSUB1150
2160 GOTO 1300
2170 REM**************************
*******
2180 REM*********** INITIALISE  **
*******
2190 REM**************************
*******
2200 PRINT"";
2210 PRINT"______________"
2220 PRINT"INITIALISE:■"
2230 PRINT"PLEASE LOAD DISK":GO
SUB1150
2240 PRINT"______________________
______"
2250 PRINT"INITIALISING DISK DR
IVE"
2260 OPEN5.8 15."INITIALISE":CLO
SE5
2270 GOSUB1220
2280 GOSUB1150
2290 GOTO1300
2300 REM**************************
*******
2310 REM*********** VALIDATE. ***
*******
2320 REM**************************
*******
2330 PRINT"";
2340 PRINT"______________"
2350 PRINT"VALIDATE:■"
2360 PRINT"PLEASE LOAD DISK":GO
SUB1150
2370 PRINT"__________________"
2380 PRINT"VALIDATING DISK"
2390 OPEN6,8,15,"VALIDATE":CLOSE
6
2400 GOSUB1220
2410 GOSUB1150
2420 GOTO1300
2430 REM**************************
*******
2440 REM************* COPY. *****
*******
2450 REM**************************
*******
2460 PRINT"";
2470 PRINT"______"
2480 PRINT"COPY ■"
2490 PRINT"PLEASE LOAD DISK":GO
SUB1150
2500 PRINT"COPY OR MERGE ? ";
2510 GOSUB1190
2520 IFA$="M"THENPRINT"M":GOTO26
20
2530 IFA$<>"C"THEN2510
2540 PRINT"C":PRINT"ORIGINAL NAM
E:";
2550 INPUTOO$
2560 IFOO$=""OROO$="$"OROO$="*"T
HEN2430
2570 PRINT"NEW NAME:";
2580 INPUTNN$
2590 IFNN$=""ORNN$="$"ORNN$="*"T
HEN2430
2600 FF$="COPY0:"+NN$+"=0:"+OO$
2610 GOTO2810
2620 PRINT"HOW MANY FILES (2-4)?
";
2630 GOSUB1190:A=VAL(A$)
2640 IFA<2ORA>4THENGOTO2330
2650 PRINTA$"'
2660 MM$(1)="":MM$(2)=""
2670 MM$(3)="":MM$(4)=""
2680 FORB=1TOA
2690 PRINT"FILENAME #";MID$(STR
$(B),2);
2700 PRINT":                    ";
2710 PRINT"|████████████████|";
2720 INPUTMM$(B):T$=MM$(B)
2730 IFT$="*"ORT$=""ORT$="$"THEN
2690
2740 IFB<>1THENMM$(B)=",0:"+MM$(
B)
2750 NEXTB:PRINT""
2760 PRINT"NEW FILENAME:";
2770 INPUTMM$
2780 IFMM$=""ORNF$="*"ORNF$="$"T
HEN2760
2790 FF$="COPY0:"+MM$+"=0:"+MM$(
1)+MM$(2)
2800 FF$=FF$+MM$(3)+MM$(4)
2810 OPEN7,8.15:PRINT#7,FF$:CLOS
E7
2820 GOSUB1220
2830 GOSUB1150
2840 GOTO1300
2850 REM**************************
*******
2860 REM**************************
*******
2870 REM***** MACHINE CODE LISTIN
G. ****
2880 REM**************************
*******
2890 REM**************************
*******
2900 :
2910 :
2920 ,C000  A2 03      LDX #$03
2930 ,C002  20 C6 FF   JSR $FFC6
2940 ,C005  20 CF FF   JSR $FFCF
2950 ,C008  20 D2 FF   JSR $FFD2
2960 ,C00B  D0 F8      BNE $C005
2970 ,C00D  A9 0D      LDA #$0D
2980 ,C00F  20 D2 FF   JSR $FFD2
2990 ,C012  4C CC FF   JMP $FFCC
3000 :
3010 :
```

Data moving routine

Wai Kei Ho,
Aston,
Oxfordshire.

Amstrad

THIS PROGRAM is written for people who have got disc drives and want to store binary file directly from the disc into the locations occupied by the disc operating system. All addresses entered are decimal values, otherwise '&' must be added in front of those hexadecimal addresses.

The data moving routine must not be in the locations of the moved file or the destination. If the file moved does not overlap the destination file, the file will be moved from the beginning, otherwise from the end.

If moved file is stored on tape, firstly load the file into where it does not overlap the DOS; the sum of the start address and the length must be less than 42619. The store it onto disc. To run this routine, the file must first be loaded into the computer with the data moved from the start address which is calculated by yourself.

If you do not bother to calculate the routine starting point and file moved starting points, then delete the following lines:

190, 200, 250, 260, 290, 340 350 and 550

And add the following lines:

```
250 RS=42615-LM-22:MS=42615-LM:
    MT=MT+LM
260 HL=&2B:DE=&1B:1bytea=&77:
    hbytea=&A6
```

But attention must be paid that the file moved start address now indicates where to start loading data into the main memory, not where to commence moving the data. It is because you do not know the start address without calculation, so that this address must be shown. Here is an example:

File	Start address	Length	Entry point
a	4900	24576	0
b	31448	12288	32768

Hence the informations entered may be as follows:

Routine starting point	29800
Data moved starting point	30000
Length	12288
Destination	31448
Executed point	32768
Title move	

After that, use a simple program to link these three programs stored on the same disc.

```
10 MEMORY 4899
20 LOAD "a":Load "Move"
30 LOAD "b",30000
40 Call 29800
```

```
100 REM *************************
110 REM ** data moving routine **
120 REM **          for         **
130 REM **    AMSTRAD CPC 464   **
140 REM *************************
160 MODE 1:INK 3.16.25:SPEED INK 30.50
170 PEN 3:PRINT TAB(9)"* DATA MOVING ROUTINE *"
180 LOCATE 1.6:PEN 2:PRINT"Enter the following items :
":PRINT:PRINT:PRINT
190 PEN 1:INPUT"Routine starting point : ".rs:PRINT

200 INPUT"File moved starting point : ".MS:PRINT
210 INPUT"Lenght of data moved : ".LM:PRINT
220 INPUT"Address of destination : ".MT:PRINT
230 INPUT"Executed address : ".EA
240 IF rs>65536 OR MS>65536 OR MT>65536 THEN PRINT CHR
$(7):GOTO 100
250 IF MS+LM>MT THEN MF$="END" ELSE MF$="BEGINNING"
260 IF MF$="END" THEN MS=MS+LM:MT=MT+LM
270 MS$=HEX$(MS):MT$=HEX$(MT):LM$=HEX$(LM):EA$=HEX$(EA
)
280 REM ** convert addresses to hi and low bytes data
**
290 lbytea=VAL("&"+RIGHT$(MS$,2)):hbytea=VAL("&"+LEFT$
(MS$,2))
300 lbyteb=VAL("&"+RIGHT$(MT$,2)):hbyteb=VAL("&"+LEFT$
(MT$,2))
310 lbytec=VAL("&"+RIGHT$(LM$,2)):hbytec=VAL("&"+LEFT$
(LM$.LEN(LM$)-2))
320 IF EA$="0" THEN  er=&C9:ro=19:GOTO 350 ELSE er=&CD
:ro=21:GOTO 330
330 lbyted=VAL("&"+RIGHT$(EA$,2)):hbyted=VAL("&"+LEFT$
(EA$.LEN(LM$)-2))
340 REM ** increment / decrement those registers **
```

```
350 IF MF$="END" THEN HL=&2B:DE=&1B ELSE HL=&23:DE=&13
360 REM ** poke  start,destination and lenght into reg
isters respectively **
370 POKE rs,&21:POKE rs+1,lbytea:POKE rs+2,hbytea:POKE
 rs+3,&11:POKE rs+4,lbyteb:POKE rs+5,hbyteb:POKE rs+6,
&1:POKE rs+7,lbytec:POKE rs+8,hbytec
380 POKE rs+9,&7E:POKE rs+10,&12:POKE rs+11,HL:POKE rs
+12,DE:POKE rs+13,&8:POKE rs+14,&78:POKE rs+15,&B1
390 POKE rs+16,&20:POKE rs+17,&F7:POKE rs+18,er:POKE r
s+19,lbyted:POKE rs+20,hbyted
400 REM ** data checking **
410 CLS
420 PEN 3:PRINT TAB(12)"* FINAL RESULT *":PRINT:PRINT:
PEN 1
430 ct=0:PRINT HEX$(rs)+":";
440 FOR i=rs TO rs+ro-1
450 pn$=HEX$(PEEK(i)):ct=ct+1
460 IF LEN(pn$)=1 THEN pn$="0"+pn$
470 PRINT pn$+" ";
480 IF ct>7 THEN ct=0:PRINT:PRINT HEX$(i)+":";
490 NEXT i
500 LOCATE 1,7:PRINT"Routine starting point :";rs;" =&
";:PEN 3:PRINT HEX$(rs):PRINT
510 PEN 1:PRINT"Data moved start address:";ms;" =&";:P
EN 3:PRINT MS$:PRINT
520 PEN 1:PRINT"Lenght of data :";LM;" =&";:PEN 3:PRIN
T LM$:PRINT
530 PEN 1:PRINT"Store data into : ";MT;" =&";:PEN 3:PR
INT MT$:PRINT
540 IF EA<>0 THEN PEN 1:PRINT"Executed address :";EA;"
 =&";:PEN 3:PRINT EA$:PRINT
550 PEN 1:PRINT"Start moving from ";:PEN 3:PRINT MF$
560 LOCATE 14,22:PEN 2:PRINT"CORRECT ?(Y/N)"
570 fa$=INKEY$:fa$=UPPER$(fa$):IF fa$="Y" THEN 600
580 IF fa$="N" THEN RUN
590 GOTO 570
600 LOCATE 14,22:PRINT"
610 INPUT"Title ";title$
620 SAVE title$,b,rs,ro
630 NEW
```

Compact

K Feary,
Wendover,
Buckinghamshire.

Spectrum

COMPACT IS A set of three routines for the 16/48K Spectrum that will allow you to reduce the size of a program and make it faster.

The first routine replaces the digits of a number with a decimal point. Since the interpreter tests for "." before Bin and numeric characters the number is found sooner. However, once this has been done you will have to retype the digits if you edit a line with numbers in, so it's best to use this routine only when the program is fully debugged. Alternatively, you can protect digits by adding Rem to the beginning of a line.

The second routine reduces long variable names to two characters. The new names will be A0, B0, C0...ZZ in the order the variables are used in the program.

The final routine will join as many lines together as possible while ensuring that the program still works and is not made slower. The line numbers in Gotos etc. must be constants, but no check is made for List, LList, or Save ""Line, so these lines may "disappear".

All the routines, especially delete digits, can take some time to compact a large program. Clearing the variables will reduce this slightly.

Type in and Run the listed program. You will be asked for the start address, any high value will do as long as the program doesn't go beyond P Ramt. For instance, to put Compact just below the UDGs enter 32108 or 64876 depending on Ram size. When all the Data has been Poked the address of each routine will be printed and the code Saved. To Load the code use:

CLEAR start-1:LOAD ""CODE

The routines can then be called in the usual way, i.e.: RAND USR address of routine

```
   1 REM ************************
   2 REM COMPACT © K.FEARY.1984.
   3 REM ************************
   4 REM
   5 DATA 205,427+start,254,46,4
0,19,254,198,40,15,205,135,44,48
,25,254,65,56,5,205,65,41,223,24
,14,54,46,64,93,35,126,254,14,32
,250,19,205,399+start,43
   6 DATA 205,452+start,24,213,2
37,123,61,92,205,179,30,33,65,48
,34,146,92,205,427+start,205,141
,44,48,64,235,231,235,205,138,44
,48,58,34,93,92,229,217,229,205
   7 DATA 31,28,35,48,30,237,91
,146,92,205,182,42,123,28,254,90
,32,10,30,55,122,20,254,57,32,2,2
2,65,237,83,146,92,205,255,42,21
7,225,217,209,35,237
   8 DATA 160,237,160,223,205,39
9+start,43,205,452+start,24,182,
42,83,92,205,366+start,32,101,23
1,246,128,42,69,92,254,235,40,73
,254,237,229,245,204,347+start,2
41,225,40
   9 DATA 25,35,254,236,40,242,2
54,247,40,238,254,250,40,19,254
234,40,45,254,254,40,41,254,229
32,40,231,205,72,32,1,0,0,254,46
,40,7,40,22,205,27
  10 DATA 45,56,117,62,14,71,237
,177,205,180,51,126,205,72,32,32
,100,205,153,30,95,105,205,347+s
tart,223,254,234,40,5,205,57,30
48,160,42,85,92,24,150,42
  11 DATA 83,92,205,321+start,20
5,184,25,235,205,321+start,229,2
05,360+start,203,126,225,40,240,
229,213,235,17,0,0,205,135,25,35
,205,136,25,62,254,146,209,225,2
50,103
  12 DATA 254,13,19,213,84,93,35
,35,78,35,70,35,197,205,229,25,4
3,54,58,193,225,94,35,86,235,9,2
35,114,43,115,43,43,24,186,126,2
30,192,200,42,83,92
  13 DATA 126,230,192,194,176,27
,229,205,360+start,203,254,225,2
05,184,25,235,24,237,205,110,25,
126,230,192,192,205,360+start,20
3,190,201,35,35,35,195,171,40,12
6,230,192
  14 DATA 192,50,71,92,86,35,94,
237,83,69,92,35,229,221,225,94,3
5,86,34,93,92,25,35,34,85,92,237
,98,217,201,205,221,25,197,196,2
32,25,217,193,9,217
  15 DATA 201,126,205,182,24,254
,34,34,93,92,192,35,71,237,177,2
4,240,42,83,92,205,366+start,194
,176,27,231,253,52,13,254,206,32
,9,35,205,411+start,254,41,32
  16 DATA 248,35,205,411+start,2
54,58,40,232,254,203,40,228,254,
234,40,3,254,13,192,217,221,94,0
,221,86,1,235,237,82,221,117,0,2
21,116,1,42,85,92,24,194
  20 INPUT "start address?";star
t
  30 IF start+491>PEEK 23732+256
*PEEK 23733 THEN GO TO 20
  40 RANDOMIZE start: CLEAR star
t-1: LET start=PEEK 23670+256*PE
EK 23671
  50 FOR a=0 TO 491: READ b: IF
b>255 THEN RANDOMIZE b: POKE sta
rt+a,PEEK 23670: LET a=a+1: POKE
 start+a,PEEK 23671: GO TO 70
  60 POKE start+a,b
  70 NEXT a
  80 PRINT "Delete digits :- ";s
tart'"Shorten var names :- ";sta
rt+46'"Join lines :- ";start+136
```

■

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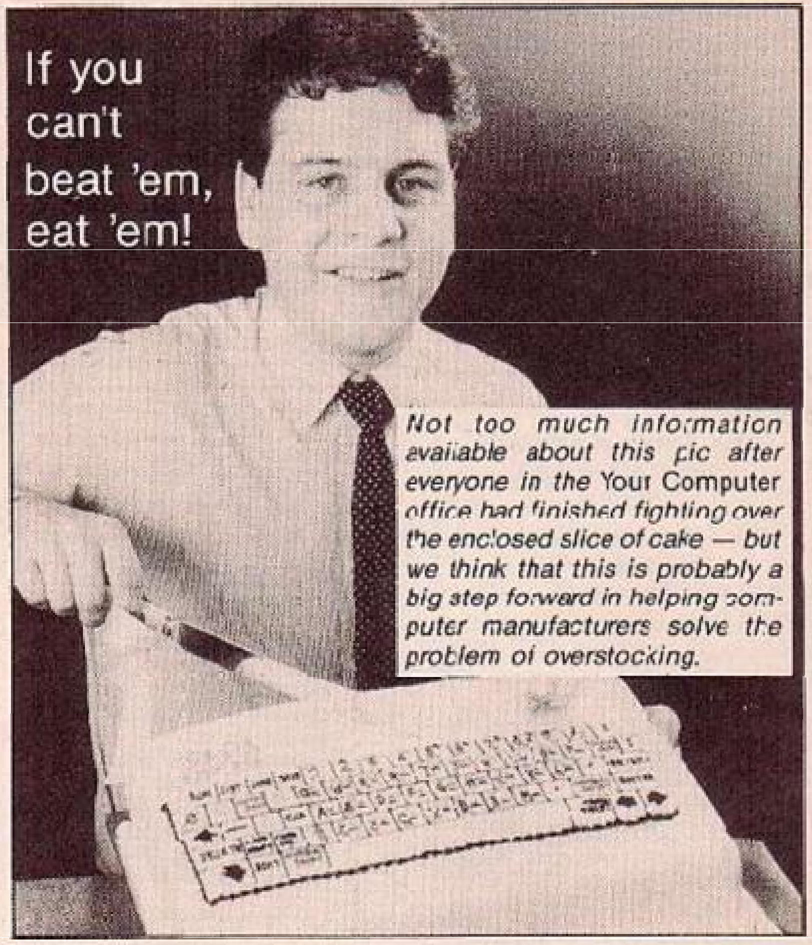
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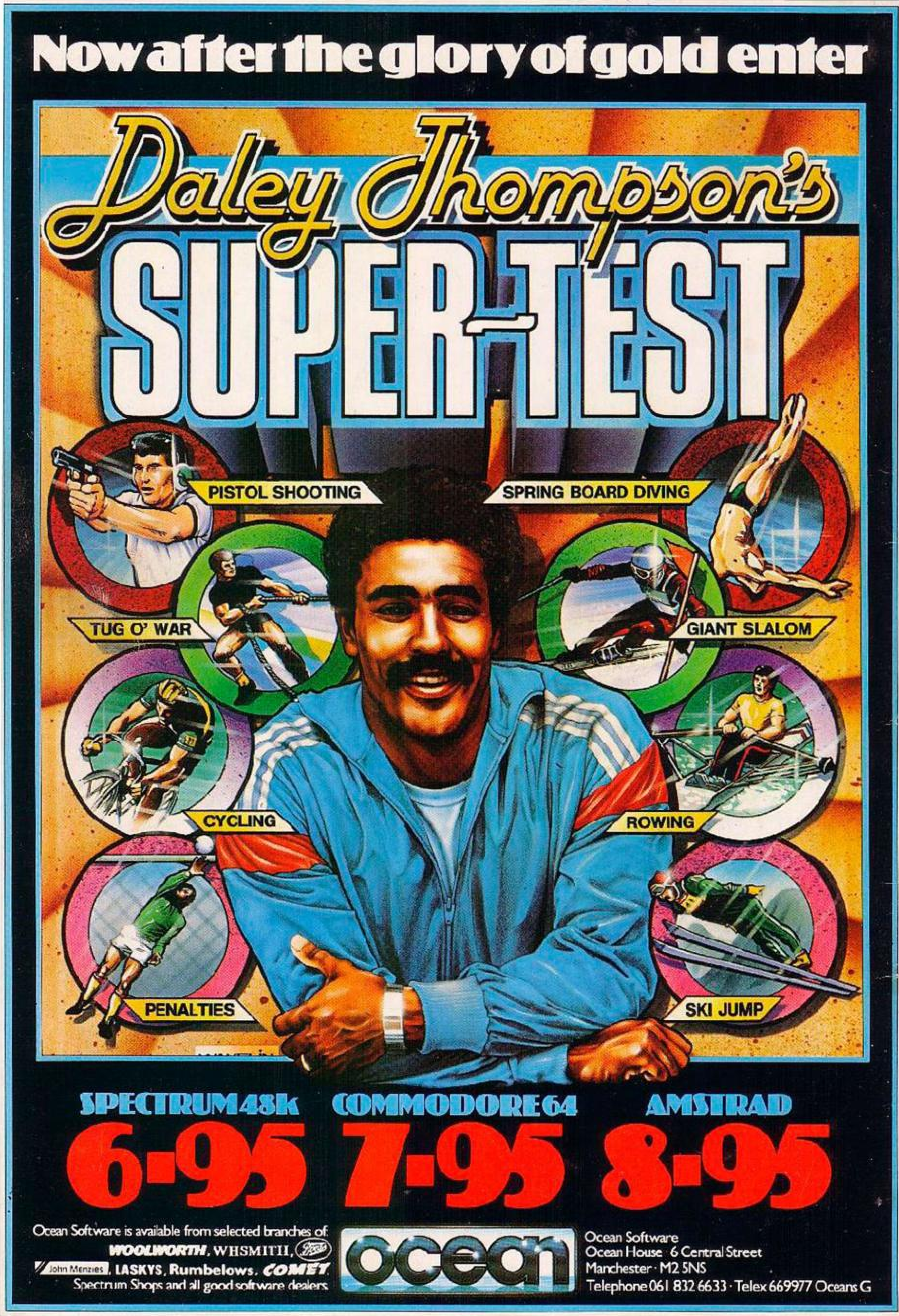
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Not too much information available about this pic after everyone in the Your Computer office had finished fighting over the enclosed slice of cake — but we think that this is probably a big step forward in helping computer manufacturers solve the problem of overstocking.

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